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OPENING ADDRESS BY THE PRESIDENT, SESSION 1895-96.

I FEEL obliged to refer to what took place at one of our meetings last session. I would remind you that neither the Council nor the Society, as a whole, is responsible for the statements made or the various opinions expressed in papers read at our meetings, or in the discussions which usually follow. In the discussion on the paper by Mr. Scott Elliot, some remarks on German officers were made by Mr. Stanley, which have given offence to our friends in Germany. I am sure that the meeting did not take those remarks literally or seriously, and we certainly had no sympathy with them. It would, therefore, be quite misleading for any one to assume that, because such remarks were allowed to pass unnoticed, they were approved.

In opening the Session you will expect me to refer to the great work of the recess, the success of which was due to the efforts of the Fellows of this Society. It is not, perhaps, for us to dwell upon the result of those efforts, but we may well rest satisfied with the judgments expressed by our foreign guests who attended the International Geographical Congress. There have been numerous reports and articles on the Congress in nearly all the countries of Europe and in the United States by eminent geographers, and many private letters, and they are unanimous in expressing their sense of the great success of the Congress as regards its scientific objects, and their satisfaction at the way in which they were received in this country. Among many others, I may mention the very appreciative reports by M. de Lapparent, the President of the Central Committee of the Paris Geographical Society; by Dr. Wegener, of Berlin; by Dr. Supan, of Gotha; by Prof. Penck, of Vienna; by Prof. Kan, of Amsterdam; and by Prof. Ricchieri to our colleagues in Italy.

The amount subscribed was £4265; and, with the exception of £560 contributed by the general public, the whole was received from Fellows of our Society (£2562); or from the Government and public bodies (£1143). There were 1500 members of the Congress, of whom no less than 500 were foreigners; and the suitable reception of our guests affected our national credit, and became a public duty. This was recognized by Her Majesty's Government. We have cause to be specially grateful to His Royal Highness the Duke of York, for the *éclat* his presence and his admirably delivered address gave to the opening meeting. This, together with the grant of £500 by the Treasury, and the good offices of other public departments, gave a semi-official character to the reception of the foreign delegates. It was thus officially recognized that our success was a matter of national concern, as it undoubtedly was, because if the bonds of friendship and good-will between the people of this country and our neighbours have been strengthened through our efforts at the Congress, a public service has been rendered. We may rest assured that our foreign guests left these shores well satisfied with their reception, and with the most friendly feelings towards their hosts.

There are, I consider, three measures which will make the London meeting a fresh starting-point in the history of these Geographical Congresses, and will tend to ensure equal or greater results from their assembly in the future. The first is our introduction of a system of consultation on all important questions by an International Committee of Vice-Presidents. This plan gave coherence to the proceedings, and it was very striking to see with what harmony and good-will the eminent geographers of various nationalities worked together. The second measure is the continuance of the President and secretaries in office until the next meeting; and the third is the resolution by which all the geographical societies of the world are placed in communication with the permanent officials of the Congress.

I congratulate the Fellows of this Society on the great and memorable success of their efforts, and I thank them most heartily and sincerely for the generous and zealous way in which they responded to my appeals, and worked to secure that success. The volume containing the addresses and papers read at the Congress is being edited by Dr. Mill, and will be available for all members early in the ensuing year.

Turning from the past to the future, we have the prospect of an active and interesting session before us. The news of the success of the enterprise of Dr. Donaldson Smith in Africa is most welcome. He has penetrated to the shores of Lake Rudolf from Somaliland, in the face of great difficulties, and has reached the coast at Lamu; so that we may soon expect to welcome him in this country. A telegram has been received stating that Mr. and Mrs. Littledale have arrived in Kashmir, and we hope to welcome them during the course of the

session, after their adventurous journey in Tibet. We also anticipate the reception of several important papers of a more specially scientific character, and the afternoon meetings in the Society's map-room, which were commenced in the last session, will be continued.

As President of the International Geographical Congress, it has become my duty, in compliance with the terms of a resolution, to represent the importance of Antarctic exploration to the First Lord of the Admiralty. We shall certainly do our best to secure the great end in view; if not now, at least when happier times arrive. It has been our conviction that, while much exploring work can well be executed through private enterprise, there are some services of this kind which are better done under Government auspices. Antarctic exploration, combining a magnetic survey, is one of the latter. In times past our Governments have ever been prompt to undertake such work, knowing that they were representing the feelings and wishes of the people. If this is not the case now, we must resort to the other alternative, and strive to do this great national work ourselves.

For private enterprise has done and is doing glorious work in the interests of geographical science. We have all been deeply interested in the return of the *Windward*, and in the news she has brought of the proceedings of the gallant explorers in Franz Josef Land. You are longing to hear this news at first hand, and I will now, therefore, introduce Mr. Montefiore, who has done such good service in connection with the equipment of the Jackson-Harmsworth expedition, and request him to read his paper.

THE JACKSON-HARMSWORTH NORTH POLAR EXPEDITION: AN ACCOUNT OF ITS FIRST WINTER AND OF SOME DISCOVERIES IN FRANZ JOSEF LAND.*

By ARTHUR MONTEFIORE, F.G.S.

Two and twenty years ago—on August 30, 1873—the group of ice-covered islands known as Franz Josef Land was discovered accidentally by the Austro-Hungarian Expedition under circumstances of more than ordinary interest. For the *Tegethoff*, the ship of that expedition, had been beset off the coast of Novaia Zemlia on August 20, 1872, in 76° 22′ N. lat., 63° 3′ E. long., and throughout the succeeding autumn and a winter of exceptional severity had slowly drifted, first in a north-easterly, then in a westerly, and finally in a northerly direction. With the return of the sun in the early spring, and the gradual moderation of the climate, the explorers looked for that breaking up of the ice which would enable them to steer their ship on its course. For they had been

* Paper read before the Royal Geographical Society, November 11, 1895.

held captive in the ice, carried by wind and current along a course which varied from day to day, and at a speed seldom exceeding a mile or two per diem. But the summer of 1873 brought no such escape, and as the month of August drew to an end, the explorers gave up all hope of their being able either to advance in the route they desired, or return to Europe to recoup the strength already threatening to succumb. Yet, just at the moment when their hopes seemed most baffled and their chance of escape least probable, the hour of a glorious discovery drew near. "Not a man among us," wrote Julius Payer, "believed in the possibility of discoveries;" and yet the long aimless drift of the *Tegethoff* had brought them to the most northern land yet discovered in the eastern portion of the Arctic Regions.

For on August 30, 1873, when in 79° 43′ N. lat. and 59° 33′ E. long., the deep mist in which the ship lay enveloped suddenly lifted and left the northern horizon clear. There, away to the north-west, ranged the bold lines of lofty coasts and the glistening slopes of an ice-sheeted land. Separated from the ship by many miles of dense and rugged pack, and obviously a country to the last degree inhospitable, the sight of this land might well have checked the enthusiasm of the party, already enfeebled by exposure to ice and snow, and well entitled to be weary of the rigours of Arctic scenery. But it is scarcely necessary to remind this Society that both Weyprecht and Payer, our gold medallists, were true geographers and explorers, and that the men they commanded were loyal to the core. The sight of this land had turned the long melancholy drift of failure into a great and splendid success, for a new and hitherto unsuspected country had been discovered in a latitude higher than that of any known land in the eastern hemisphere. The possibilities it might afford of further advance into the unknown region about the North Pole were probably greater than those offered by any other route—in a word, the discovery was of the first magnitude, and Payer enthusiastically wrote, "There was now not a sick man on board the *Tegethoff*."

Here, and in this way, then, was Franz Josef Land discovered—Franz Josef Land, named in loyalty after the Emperor of Austria, in the same spirit which placed the name of our sovereign in the highest southern latitudes yet reached, and which led Peary to give to the termination of his northern advance, on July 4, 1892, the name of Independence Bay.

But the fate of long endurance, which up to this date had characterized the Austro-Hungarian expedition, dogged it to the end. Locked fast in the ice, and slowly drifting now north, now south, and now west, it was impossible to leave the ship even for the temporary satisfaction of an hour's examination of the coast; and although brief visits were made on November 1, 6, and 7, to the shores of what was called Wilczek Land, the position of the ship was so perilous, and the winter darkness

so impenetrable, that nothing further could be done till the following spring. It was then that Payer made his memorable march up Austria sound, and, ascending Cape Fligeley, looked poleward over that mass of high land lying north of the 83rd degree, which, called by him Petermann Land, remains to-day the land of the greatest promise in the whole of the Arctic Regions.

Then, too, did he reveal the intensely Arctic character of Franz Josef Land, and lay down roughly, in his rapid march north and south, those coast-lines and glaciers which until the other day formed our only conception of the interior of Franz Josef Land. I need not add here the story of the ultimate abandonment of the *Tegethoff*, nor that of the ever-memorable retreat of the expedition in open boats and under circumstances of terrible privation; but their experience proved sufficient for a number of years to give Franz Josef Land, its configuration, its climate and its avenues of approach, a very bad name indeed. If the land could be safely made and safely left, it held out great possibilities; but the Austro-Hungarian Expedition had apparently made it clear that neither the one nor the other could be relied on—that the chance of the safety of an expedition was remote indeed.

It remained for our own countryman, Mr. Leigh Smith, to give Franz Josef Land a better name. As a matter of fact, we owe it to him and his interesting voyages in the *Eira*, that the general conception of the difficulty of reaching Franz Josef Land underwent, not merely a change, but a complete revolution. The voyage he made in 1880 served to emphasize, among other things, the great variation from year to year in the conditions of Arctic navigation. Over the very spot where the *Tegethoff* was abandoned, frozen fast in the solid pack, Mr. Leigh Smith steamed without difficulty in open water. The Austrian Expedition, beyond going almost due north and south to and from Cape Fligely, had only just touched the south-east point of M'Clintock island and, as we now learn from Mr. Jackson, guessed at the land on the west of Markham sound. It was Mr. Leigh Smith's plucky navigation in 1880 which revealed to us the southern coast of M'Clintock, Brady, Hooker, May Etheridge, Northbrook, Bruce, Mabel, and Bell islands; which opened up, headland after headland, the great western region he called Alexandra Land, with its capes Grant, Crowther, Neale, Ludlow, Lofley; which enabled him to explore Nightingale sound and the harbours of Gray bay and Bell island; to penetrate westward as far as 44° E. long., and as far east as 59° E. long.; and to show that the intensely Arctic scene drawn by Payer might be modified—that at the foot of the hills of eternal ice there ran, in the short summer, a narrow ribbon of green grass, flecked here and there with sprays of flowers, blue and yellow and white; and that, chief of all, no insuperable difficulty was encountered either in approaching or leaving Franz Josef Land, when the ship kept between the meridians of 45° and 55° E. long.

And again, in 1881, the accessibility of Franz Josef Land was proved with even more striking emphasis, for the northward route of the *Eira* lay between 45° and 50°, and showed scarcely any of the deviation and winding which usually characterize the track of ships passing through the pack. The unfortunate loss of the *Eira*, when in a position of comparative safety off the coast of Franz Josef Land, necessitated the wintering of the expedition on Franz Josef Land; and while this entailed some personal suffering and privation, it resulted in a valuable series of experiences and observations.

The fluctuation of the winter temperature; the immense quantity of fresh food supplied by bears, seal, and walrus; the open water that occurred even in mid-winter; and the early break up of the ice;—all served to present Franz Josef Land in a new and more favourable light to the Arctic explorer. For here was a land which we now learnt could be reached with fair fortune in any ordinary year; where winter quarters for the ship and land quarters for the explorers might be found; where abundance of fresh animal food was ready to the rifle; and where exploration might be carried on in the autumn and early spring on firm ice, and during the summer in open water by boat. The fact that Mr. Leigh Smith had no intention of wintering in Franz Josef Land, and that in consequence he had neither fur outfits nor sledging equipment, rendered it impossible for him to carry out any exploration during his enforced detention; but, in the course of his summer journey and his winter pursuit of fresh food, he learnt enough to add considerably to our knowledge of the islands off the southern coast of Franz Josef; and his careful husbanding of the strength and health of his crew, aided most efficiently as he was by Dr. Neale, was subsequently justified by the excellent work they performed when retreating to Novaia Zemlia in open boats.

Is it not a singular thing that, for eleven years subsequent to this remarkable proof of the great suitability of Franz Josef Land as a means of approach to the unknown North, not a single expedition should have been despatched to its shores? Expert opinion, basing its views mainly on the experience of Mr. Leigh Smith, was practically unanimous in placing Franz Josef Land above all positions in the Arctic Ocean, as the vantage point of a polar expedition. In the discussion which took place before this Society, after Mr. Clements Markham, then the honorary secretary of the Society, had read his interesting paper on Mr. Leigh Smith's discoveries, Sir George Nares declared that "he had opened up what, according to present lights, must be the future route to the pole." Captain Beaumont was of opinion that "Franz Josef Land appeared to offer the best facilities at present;" and Admiral Sir Erasmus Ommanney admitted that "we must now accept Franz Josef Land as the base for future operations." And, again, in 1883, after Mr. Markham had read a paper on the experiences of Mr. Leigh Smith in 1881 and 1882, expert

opinion was similarly emphatic and unanimous. Sir Allen Young, who had gone out in command of the Leigh Smith Relief Expedition, and had met with the party at Matotchkin Schar, declared that "Franz Josef Land now appeared to be the only land, extending far to the north, by which such journeys could be made;" and emphatic, too, were the remarks made by Sir George Nares on the advantages which Franz Josef Land held out as winter quarters.

Still nothing was done to take up and continue the work which had begun so auspiciously. Arabs and ivory had taken possession of the geographical mind, and Arctic exploration was apparently forgotten. Yet there was one man who bore gallant testimony for a renewal of Arctic work, with a special appeal for the claims of Franz Josef Land—I allude to Admiral Markham, who in the *Isbjorn*, in 1879, had come very near indeed to sighting the southern coast. In his 'Life of Sir John Franklin,' he occupies the concluding pages of the volume with a strong presentation of the case for Franz Josef Land. He points out how experience favours and probability augurs for success in this remote part of the Arctic Region; and I do not think I am betraying a confidence when I say that it was Admiral Markham's opinion which weighed so strongly with Mr. Harmsworth, when he finally undertook to despatch an expedition to Franz Josef Land.

Yet, independently of this, and relying only on the experience of Payer and Leigh Smith, a young Englishman, who had already received baptism in Arctic waters, was thinking out a shrewd and plucky plan of discovery in the unknown polar area by way of Franz Josef Land. This countryman of ours was Frederick George Jackson. Early in 1893, on February 1, he communicated in a letter to the press an outline of the plan he proposed to follow on arriving at Franz Josef Land—a plan which was so carefully thought out and based on grounds so secure, that he is now pursuing practically the identical method he then advocated.

But at that time no munificent patron had come forward to provide the very large funds which a thoroughly well-equipped Arctic expedition demands; and Mr. Jackson himself was anxious to test, with a special view to the geographical conditions of Franz Josef Land, the various articles of a complete sledging equipment. It was this anxiety which led him to start in the summer of 1893 for the Samoyad settlement of Habarova and undertake his subsequent mid-winter sledging journey over the frozen Tundras. What good work he did, and how he accomplished, under severe climatic extremes, a journey of nearly 2500 miles, are narrated in simple and unaffected language, eminently characteristic of the author, in his book, 'The Great Frozen Land.' This book was published as recently as this year, and was without exception most favourably received. Unquestionably, it gives us the best and most authoritative account in the English language of that strange

remnant of a primitive folk—the Samoyads—and the only description which exists of Waigatz island and the Great Tundra lying between the Ob and the Pechora. Among works of Arctic travel it occupies a unique position, and must be consulted by every student of Arctic geography and anthropology.

It was during Mr. Jackson's absence on this adventurous and arduous journey that I had the good fortune to make his work and projects known to Mr. Alfred Harmsworth. There was no occasion to dwell on the scientific value of polar exploration, nor on the desirability of England once again assuming her rightful place in the van of Arctic discovery; for in Mr. Harmsworth I found a close student of the history of polar exploration, and all the ardour of an enthusiast. For many years he had read and noted all that went on in connection with this fascinating branch of geographical work, and he was perfectly aware of its needs and demands. Moreover, I found in him an eager, an uncompromising patriot; one who desired above all to see the Union Jack again going forward across the unknown and unexplored regions of the polar basin. With the keenest admiration for the persistent pluck of Peary and the hardihood of Nansen, he was at the same time almost impatient to see an Englishman take up this great work of endeavour and endurance, and uphold in the far North those undying laurels which were won by the labours, the lives, ay, and the deaths, of a long line of our illustrious countrymen.

With his decision to send Mr. Jackson in command of a fully equipped expedition, the genesis of the Jackson-Harmsworth Polar Expedition was complete, and its projects and some of its accomplishment are now familiar to you.

In the month of June, 1894, Mr. Jackson read a paper before this Society, in which he dwelt on the plans he hoped to pursue, and described the more novel parts of the equipment with which he was so abundantly provided. For the details of that paper, I must refer you to the issue of our *Journal* published in August of last year; it is sufficient for me merely to mention here that on arriving at Franz Josef Land he intended the expedition to become almost entirely a sledging expedition, and that the sledges and boats were of a type specially adapted to the purpose in view. The *Windward*—a whaler of excellent record, which had been purchased and fitted out by Mr. Harmsworth—sailed from Greenhithe on July 12, and arrived on the 31st at Arkhangel, where she took in the log-houses, ponies, and Samoyad fur outfits which have proved so unqualified a success during the past year. Thence she sailed to Habarova, where the Siberian dogs were shipped; and then she turned north toward the ice-pack and that land of promise which the Austrians had discovered two and twenty years before. From the date of her entering the pack all knowledge of her movements and fortunes became impossible, and it was only as recently as September, with her emergence

from the pack and return to Europe, that we learnt the latest tidings of the expedition. The ship had been frozen in the pack almost as soon as she had reached Franz Josef Land, and on her southward voyage this year desperate and gallant had been the struggle against the odds of the heavy ice. Only now, indeed, has it become possible to tell, even briefly, the story of the last eventful year; and it is with peculiar pleasure, but with considerable diffidence, that I now attempt to obey the command laid upon me by our President, and give you in outline something of that story, interspersed as it is with tale of discovery, incident of work, and anecdote of sport.

The *Windward* left Khabarova on August 16, and on the 17th entered a quantity of drift-ice, and soon after met with heavy fog, which continued, off and on, for several days. On the 20th the ship ran during the fog into a shallow bight of ice, but returned to the edge of the pack, proceeding in a north-westerly direction. On the 22nd, after experiencing a moderate south-west gale, with considerable sea, the ship reached the pack. This was in 76° 49′ N. lat. and 49° E. long. The ice proved thick and formidable, and it was not until the 24th that a lead was found in 78° 11′ N. lat. and 41° 44′ E. long. This possibly formed the channel between the two main masses of Spitzbergen and Franz Josef Land ice. The ship steamed up it almost in open water.

At 5.30 a.m. on the 25th Franz Josef Land was sighted, the *Windward* being then about 30 miles south of Bell island. Here, however, a heavy pack was encountered, and for the next two days little progress was made. Anchored to a floe, the ship drifted westward, but subsequently she steamed to the southward and eastward, hauling up to the north and east as much as possible.

The ice still proved unnegotiable to the northward, and the ship bore away to the eastward until stopped by a heavy pack. On the 27th she turned and went westward, and attained 79° 22′ N. lat. and 46° 8′ E. long. on the 28th. Shifting from floe to floe, some more northing was made, but on the 30th a south-west course had to be shaped to avoid heavy drifting ice. On the following day ten miles northing was made, and then again a south and easterly course became necessary, and an attempt was made to get at the back of the eastern barrier to which I have referred. When in position 79° 8′ 44″ N. lat. and 45° 10′ 15″ E. long., the course was shifted to north-east, and soon after clear water was visible ahead, and Cape Neale was sighted about 4.30 on September 1. The ship was again stopped by ice when 40 miles south of Cape Grant. The ice-master—John Crowther—believed that this ice had never broken up during the summer, and the ship once more had to steam south. Her position was at this time 78° 59′ N. lat., 46° 55′ E. long. On the 5th the ice was in a condition to ram, and at noon Bell island was bearing N. 51° E., and only 15 miles distant. On the 6th the ship was again stopped by heavy ice and a thick fog; but on the

following day she was able to force her way through into the open water, and made Bell island at noon. Franz Josef Land had at last been reached.

Mr. Armitage, writing at Mr. Jackson's request, says of the approach to Franz Josef Land, "When the ship returns in 1896, the captain will probably find an open lead of water in 78° N. lat., and somewhere between 40° and 50° E. long., which will take him nearly, if not quite, up to the land about Cape Flora. The lead lies, no doubt, between the Spitzbergen and Franz Josef Land packs. If he finds the ice still fast to the land, by no means let him give in, for our own case proves how late it may be before it comes away. If he seizes his opportunity as the ice opens out, and uses to advantage his knowledge of ice-movements, he is bound to get through. But he must not underrate the difficulties he will meet with when endeavouring to reach the land here. We found that it required continual watchfulness, determination, and perseverance."

Bell island did not afford much chance of safe quarters, especially as Eira harbour was blocked with ice. Moreover, Miers channel, the broad sound between Bell island and the road north, showed a strong current, which would indicate an early break up of the ice. The *Windward* steamed some way up the channel, and Mr. Jackson discovered a small island off Bruce island, which he named "Windward" island. They then proceeded to Cape Flora, examining that headland and the remains of Eira cottage, in which the Leigh Smith party passed the winter of 1881–82. The hut was in good state of repair, considering the lapse of time, and, being roofless, its exposure to the weather. Mr. Jackson then proceeded east to Cape Barents, keeping along the edge of the land floe; but on reaching this point he found it impracticable as winter quarters, and returned westward to Cape Flora.

On September 10 the work of discharging the great quantity of stores began, and all hands set to work—sixteen hours on and eight hours off—in the hope that it might be accomplished and the ship be ready to return before the season was too far advanced. Unfortunately, however, winter set in suddenly, and on the 13th the passage of the boats to and fro was stopped by the formation of new ice. Mr. Jackson then secured the ship in quarters safe for wintering, and at the same time favourable to an early release in the succeeding summer. She anchored in a small shallow bay on the south side of Cape Flora, in 5 fathoms of water, being quite out of the running pack and current, and protected from the pack, which a southerly gale or a strong tide might drive shoreward, by some grounded bergs. The ship secured, and the ice having now become firm, the work of discharging continued steadily, and by the end of October the two log-houses, observatory, and four store-houses had been erected, everything placed on shore, and everything in its place.

This is what Mr. Jackson says of the house, which he called "Elmwood," after Mr. Harmsworth's place in Kent: "Our house is situated on a raised beach, 115 feet above the sea, forming a wind-swept plateau, and thus kept nearly free of snow during the winter. The stable"—which was also built of logs—"is directly east of it, and the four folding-houses are in a line towards the same point. The latter proved quite useless as a residence, but came in as store-houses. The Russian house we have fitted up capitally, and lined with green baize, and it looks, and is, as snug as the inside of a gun-case. We sleep on the floor, rolling our blankets up during the day. I have not the smallest hesitation in saying that it is the best and most comfortable house ever put up in these latitudes. It has blown incessantly, often with very low temperatures, all through the autumn and winter, so we have been very glad of a good substantial house."

This house, which was expressly made for the expedition at Arkhangel, was built of large square logs 12 inches thick, morticed into each other, and well caulked with dried moss. The living-room was lighted by four windows, each with double frames, and was exactly 20 feet square. Under the same roof, however, there was a fair-sized store-room and a convenient kitchen, opening into the entrance-passage. The living-room was carpeted and strewn with fur rugs, and lined with green baize. A large round table occupied the centre; bookcases and one or two small tables stood against the walls, and these, again, were made bright with a number of framed engravings and etchings. All manner of convenient appliances were fixed about the room, while just below the ceiling there stretched from wall to wall a complete and most useful series of racks. Stoves and lamps had been much discussed before the expedition left England, and the artificial light throughout the winter was not inferior in illuminating power to gas. It is not surprising, therefore, to find Mr. Armitage cheerily writing, as he does in a letter to me, "I can well picture to myself you sitting before your blazing fire during the dreary, cheerless months of winter; and how, as your thoughts turned towards the *Windward*, you mentally exclaimed, 'Poor beggars! I wonder where they are?' You will indeed be pleased to know that all that pity has been wasted, for we have been housed in comfort, and have lived in luxury."

The work of discharging, the securing of the ship in her winter berth, and the erection of the head-quarters on Cape Flora, effectually prevented any journey into the interior during the short spell of autumn; but before the winter darkness had become too deep for travelling, Mr. Jackson was able to erect a depôt on Cape Barents, and cache there some 600 lbs. of meat, marking the site with a spar.

Throughout the winter the exploring party—eight in number—

remained on shore, while the crew, under the charge of the sailing master, were on board the *Windward*. Owing, however, to the illness of Captain Schlosshauer, the sailing master, Mr. Jackson had practically the charge of the ship, and almost daily visited her, and sent on board fresh bear and walrus meat and a large number of birds. In order to obtain that exercise which he considered so necessary to the well-being of all hands, football and hockey were frequently played on a small piece of unusually smooth ice; the neighbouring country was repeatedly traversed; while the search for bears and their subsequent capture provided excitement as well as exercise. The bears' blood was most carefully preserved, and immediately frozen into lumps of handy size; and these were then ready to use in the savoury soups and stews provided by the cook. In adopting this plan, Mr. Jackson was following the example of Dr. Neale, and he was equally successful in keeping his party in good health. When the ship left Franz Josef Land this summer, the explorers were in the very best of good health and good spirits; and I have just heard that the botanist has written to a friend and said, "I have never known till now what good health really is." This is very satisfactory, and reflects credit all round.

To give some idea of how the expedition passed the winter, I may make a rough sketch of an average day. At 8.30 the bell rang for getting up, and each member had his day of the week for a hot bath before breakfast. Nine was the breakfast-hour—breakfast consisting of porridge, fish, tinned and bear's meat, bread-and-butter with jam or marmalade, and tea and coffee. Then the house was cleaned and tidied, and the man to whose lot it fell filled the water-barrel with a fresh supply of snow. This, of course, soon became drinking-water. Until noon work was the order of the day; one occupying himself with carpentry, another with lamp-cleaning, another with making harness, traces, etc., and another with copying maps or doing anything that was needed. From 12 to 2 exercise and recreation out-of-doors was the rule. At 2 p.m. lunch was served. This usually consisted of fish, meat, bread, butter, cheese, lime-juice, and cocoa. During the afternoon more work was done—there was always plenty of work—but after lunch this was chiefly out-of-doors. For example, the making and keeping clear the roads along the full length of this most northerly British settlement—whose village street was quite 100 yards long—was in itself a considerable labour. The roads were 10 feet in width, and by the end of the winter the banks on each side of them were some 15 feet in height. The getting out and re-arranging of stores, and a score and more of odd jobs were readily found.

I should also mention that every day of the ten months during which the ship lay frozen in the ice off Cape Flora, Dr. Reginald Kettlits visited and examined the ship's crew, missing only one day out of the

three hundred, and then on account of a temporary attack of illness. Mr. Sidney Burgess proved an admirable cook, and I have given you the bill of fare for breakfast and lunch. If I refrain from also giving that for dinner, it is because Franz Josef Land is not yet ready for a sudden rush of immigrants.

Mr. H. Fisher, the botanist, is a capable amateur artist, and has made a number of sketches of considerable interest. Many photographs have been taken, and some of these have returned, but none of those taken in the interior. For these we must wait till next year. Dr. Kettlits and Mr. Fisher, I might add, regularly examined the contents

of the bears' stomachs, with a view to their probable zoological and botanical interest. Mr. Jackson is not a believer in all work and no play, and football was played on a piece of smooth ice near Elmwood during the early part of the winter. Skating could only be indulged in during the mild weather, as leather boots could not be worn when it was cold. The evenings were usually spent in reading and writing, playing chess, draughts, cards, and the like. The members of the expedition evidently passed these evenings pleasantly, as I cannot hear of any one turning in before midnight. This, then, may give you a rough idea of the way in which the long, dark, and dreary winter was enlivened and made something more than tolerable.

During the winter, Mr. Jackson found by experience that in some ways the reindeer sleeping-bags were not satisfactory, and he forthwith proceeded to test the capacity of a full outfit of Samoyad clothing to serve as the sole protection when camping out. Readers of his most interesting book, the "Great Frozen Land" (Macmillan, 1895), will remember his description of sleeping out on the Tundra in such an outfit, and it will be seen, from the following extract, that the experiment, when repeated in Franz Josef Land, proved equally satisfactory :—

"I tested myself all the sleeping-gear, etc., during the winter, sleeping out on the top of the flat roof without a tent, with the thermometer showing more than 70° of frost. On several occasions there was a gale blowing with more than 60° of frost—which is cool; so they had a fair test."

On March 10 Mr. Jackson started on a preliminary journey north. He was accompanied by Mr. Armitage, nautical astronomer, and Blomgvist, a Russian Finn, who had shipped as A.B.; and they were rationed for seven days. Taking two ponies and four sledges—the latter laden with 1700 lbs. weight of stores—they made a course between Northbrook island and Bruce island. For the first four days the weather was extremely unfavourable, the fog being very dense, and the driving snow so thick that it was impossible to make out the hummocks when only 50 yards away. The absence, too, of all shadow made it difficult to judge the ground or distinguish a rise from a depression, so that Mr. Jackson writes in a letter to Mr. Harmsworth, "One suddenly found one's self with a pony-sledge on the top of a high drift of hard snow with an abrupt drop on the other side, over which you step with a jerk. It was like travelling blindfolded." They kept going north, however, and, after crossing some very rough ice, finally made Peter Head, at the entrance to Markham sound. Here they established the first of the series of depôts on the line of their northern march, marking the spot by erecting two staffs, and hoisting the Union Jack. At this time the fog rendered it impossible to see anything of the country, and, the chief object of this preliminary journey having

been attained, the sledges were turned southward, and Cape Flora was regained on March 16. Writing to Mr. Harmsworth of this reconnaissance, Mr. Jackson says, "We experienced some pretty cool weather, getting the thermometer down to −45° Fahr., but found our equipment quite satisfactory, sleeping warmly in our soviks, militzas, pimmies, and toboks. The ponies behaved splendidly, and looked fresh and well on their return; and if poor Franklin and Parry could see them clambering (clambering is the only word) over high piled-up hummocks of ice, I think they would be amazed. We all came back with our faces absolutely raw, and our hands, especially the fingers, being much blistered with frost-bites. . . . Armitage greatly pleased me by his cheerful, happy way; he was always jolly and active, and things must have been a trifle trying occasionally to a man unused to roughing it."

On his return to the head-quarters, Mr. Jackson was detained much longer than he had expected by a variety of circumstances, among them being the temporary break up of the ice in which the ship was frozen. I may conveniently here, therefore, say a few words as to the sport obtained during the winter and spring. Nearly sixty bears in all were killed by the various members of the expedition, and about half this number fell to Mr. Jackson's rifle. It will be remembered that the Leigh Smith party did not include one female in their total bag of thirty-four; but from Mr. Jackson's list I find that between the beginning of October and the end of March—distinctly winter months in Franz Josef Land—four females were shot. On the other hand, during the months of December and January only males fell to the rifle. This, the latest experience, is unquestionably in favour of hibernation, although it seems to restrict the period within a shorter time than has hitherto been allotted. Mr. Harmsworth has received reports of several exciting incidents in connection with these rather awkward neighbours, not the least noteworthy being the experience of the ship's carpenter, who, when more than a mile from the ship, was surprised by a huge bear, which measured, when ultimately killed, nearly 9 feet in length. The carpenter clambered to the top of a hummock, which afforded him some advantage; but the bear, rearing himself up on his hind legs, proceeded to follow him. This demonstration of good fellowship was not appreciated, I need scarcely say, by the carpenter; but he waited until the bear's muzzle was within a couple of feet or so of him, and then fired his revolver—the only weapon he had with him. As is the way with revolvers on occasion, it missed fire; and "Chips" would then have been in a very awkward corner had not some of the dogs, who had scented the bear, come up at the very nick of time and attacked him. This drew bruin's attention away from the carpenter, who availed himself of the opportunity to return to the ship. It remains to this day, I believe, an article of faith among many of his comrades that he covered that mile within record time.

In the course of one of his letters, Mr. Jackson writes of an exciting experience which befell him at the beginning of February last; and perhaps I ought to say here that all the matter which I have drawn upon regarding the progress of the expedition is contained in private letters sent home. You will, I know, make every allowance for my absent friend if his style is somewhat too "familiar" for a communication to a scientific Society like ours, and if in the course of this paper you have perceived gaps which you would like to have seen filled, and silences you would have preferred broken, I must ask you to remember that I have not only to regard the question of time, but also to respect the intention of the leader of the expedition. For he has sent back nothing ostensibly for publication, and all his maps, journals, observations, notes, and collections remain with him at Franz Josef Land. I have gone through his letters to Mr. Harmsworth, and it is from these and one or two written to me that I have been able to put together some account of the Geographical work which he has been able to accomplish.

But to return to the story I have promised; and I will give it in the narrator's own words:—

"In the early morning of February 7 I had a bit of a near squeak with a bear. I had gone off hurriedly by myself at 5 a.m., with just breeches and coat over my pyjamas, having just been on the point of turning into my blankets after being out all night bear-hunting.

"I heard the dogs again barking out on the floes, so I followed the barking for two miles to an open polynia of water, at the edge of which I found a big bear engaged in making rushes at the dogs, four of which were barking around him. I wounded him badly the first shot, and he took to the water. He came out of this again and made for Miers channel over the floe, with the dogs and me after him. As he was distancing me, I fired a long shot at him, but as it was dark and misty, with falling snow, I can't say if it hit him or not; but it had the effect of making him return to the edge of the water he had left, where I came up with him again, and found him about thirty yards from the edge of it, uttering deep roars and hisses, and making rushes at the dogs. As I had left the house hastily with only three cartridges, and had fired two, I had now only one left. So, wishing to make sure of a fatal shot, I went up to within six or seven yards of him, when he rushed at me, at first with his head down. At this I fired, but just as I did so he raised it, and my bullet went between his legs. In another instant he was upon me, with his jaws wide open and a regulation menagerie roar. I had just time to ram the rifle-barrel with all my force into his mouth and draw it back for another thrust. This was apparently a trifle too much for him, as he whipped short round and took to the water. I would have given a 'tenner' for another cartridge then, as I could have killed him easily. As it was, I had to return to Elmwood for more cartridges, as I had still hopes of getting him. I there

exchanged my single-barrelled ·303 rifle for the double-barrelled ·450, so as to have a second barrel up my sleeve in case the recent accident should happen again. On returning I found he had crossed the water, and was about 150 yards off, out of further harm's way, but roaring dismally. There I was reluctantly obliged to leave him, no doubt to die, as there was no means of getting near him. My left hand was a little cut by his teeth when it entered his mouth in my thrust, and bled a good deal; and I found, on measuring afterwards, that the barrel must have penetrated his jaws 23 inches—a nasty jar for him, I should fancy. I have been charged during the winter and spring by several bears, but none got to such close quarters as this chap did. A bullet always stopped them. Polar bears are queer, uncertain animals; some are all funk and clear out, whereas others are as bold as brass and all fight, if it is inconvenient for them to run. Altogether they have afforded great entertainment during the winter, and have certainly done a great deal to relieve the monotony."

Two retrievers were taken out from England—presents to Mr. Jackson from Mrs. Harmsworth—and thirty Siberian dogs were taken on board at Habarova, having been brought from the Ob by the Russian Räving. Up to the date of the ship's leaving, not only had these dogs proved of the greatest use, but none had fallen victims to the climate or fatigue. Two had succumbed to a disease common to their kind, and one of the English retrievers, I am afraid, must be held responsible for the death of another. Mr. Jackson writes amusingly: "Carlo, by-the-by, has developed into a shocking blackguard, and is the sole representative of the criminal classes in Franz Josef Land. He now constantly wears a muzzle, which he usually has cocked over his left eye, giving him a very Bill Sykes-like appearance. He is the terror of the *Windward* people, and would kill every dog in the neighbourhood if allowed to go about unrestrained."

Three bear cubs which Mr. Jackson caught and sent home by the ship, destined for the Zoological Garden, came unfortunately to an untimely end while on the voyage, but they appear to have contributed their share to the hilarity of Elmwood. "They have no instincts," writes Mr. Jackson, "beyond feeding, biting, and scratching, but have afforded us great amusement. The interior of our house looked like a Zoo, having three bears, six pups and their mother—a Samoyad dog—as constant inmates for some time."

The winter night had come to an end with the reappearance of the sun on February 23. "Soon after this," writes Dr. Reginald Kettlits, surgeon to the expedition, "the advent of the first birds interested us not a little, and now that we have perpetual day, we have birds roosting and beginning to breed in the cliffs at the back of the house in their thousands. The dear little snow-bunting, the only small bird as yet, was specially welcome, for it reminds one more of home. It has a short but a sweet song."

At the beginning of April, the breaking up of the ice in which the ship was embedded threatened her with grave peril, being far too early in the season, of course, for any attempt at navigation. An easterly gale, with dense driving snow, had lasted from March 31 to April 4, and about noon on the latter day the ice suddenly broke up. There was literally not a minute's warning, and in a moment great rents ran across the floe and, with loud claps of thunder as it were, parted large portions of ice from the main pack. A whale-boat, sledge, and a small Union Jack were swept away and lost, and the whole of the port side of the ship, which had been firmly fixed in a mould of ice, was swept clean, and a large pool of open water left in its place. The starboard side was still held firm by the land-ice, and this, again, was held by the grounded bergs. Still, as there were no fires up and the ship had scarcely any ballast in her, the position was one of gravity. Mr. Jackson had several lines laid out and attached to the bergs, got ready for steaming, and set all hands to work ballasting the ship with ice. On the following day the gale dropped, and with it the snow ceased; and there was then revealed a great expanse of open water—east, west, and south. This, however, was not to last long; for on the same day a huge floe appeared moving rapidly down on the ship, but as the *Windward* had been prudently anchored just out of the run of the current, the floe, with a very dangerous V-pointed bow, crossed the water which had been opened on the port side of the ship, just missed the ship itself, and struck the land-floe beyond with a terrific crash, throwing up high hummocks, and making a scene of great confusion. Then, as if spent with the effort, it swung slowly round and, gently coming up to the ship, enclosed it once again. "Nothing," writes Mr. Jackson, "could have been better had it been ordered expressly for her." There she lay until her departure in July. The running pack came and went with the tide, but she was beyond the range of the current and in safety.

This and other incidents, however, caused delay in the departure of the expedition on its second journey; but on April 16 a start was made. The party again consisted of Mr. Jackson, Mr. Armitage, and Blomgvist; but was increased by Dr. Reginald Kettlits and Wm. Heyward, who were to travel with Mr. Jackson for a week and then return. With Mr. Jackson were three ponies and six sledges; with Dr. Kettlits, one pony and two sledges. The weather proved exceedingly unfavourable, and, although I will not weary you with monotonous repetitions, the following very condensed account will, at any rate, indicate its character:—

April 16, 17, 18, 19, misty; 20, 21, clear; 22, dense fog and snow; 23, 24, strong E.N.E. gale with dense driving snow; 25, snow and wind; 26, misty till 6 p.m., then clear; 27, clear till noon, then gale from E. and driving snow; 28, strong S.E. gale and heavy snow

—at times wind was of storm-force, and the snow drove furiously; 29, weather moderated towards noon; and 30, calm but thick. May seems to have been very little better, for on the 1st it is thick and misty, with wind from the S.W. until noon, when the wind gets round to the E., increases to a gale, and brings fog and sleet. On May 2 the wind again comes from the S.W., and blows a gale with thick sleet, the temperature, however, rising as high as 34° Fahr. On the 3rd the snow continues to drive, this time from the E. On the 4th a gale makes its appearance from the N.W., accompanied by snow; but at 10 p.m. the weather clears, and the 5th and 6th are actually clear days. The 7th, however, brings a strong gale from the N.N.E. (with snow); and the 8th and 9th, though calm, are misty. The 10th ushers in a strong gale from the S.E., and the snow drives hard; the 11th ditto; and the 12th ditto, except that the wind comes from the N.N.E.

This sample of May weather will interest the geographers who may have studied those maps which depict this area as one of "polar calms."

To return, however, to Mr. Jackson's itinerary. At the entrance to Markham sound and off Dundee point, they passed over thin bay ice, which was even then threatening to break up. Five days later, on April 27, a great crack, 4 feet wide, with standing water, and running miles to the westward across the pack, was encountered, and this was circumvented by making to the eastward; and on the 30th the floe became generally rotten and unreliable, and from that date to the return of the expedition to Elmwood the only difficulty encountered arose from the early break up of the ice. Everything seemed to point to an early season, and the recollection of Payer's experience in the month of April convinced Mr. Jackson that in Markham and Austria sounds the ice ordinarily breaks up early in the year.

Mr. Jackson describes the conditions of travel in the following words:—

"The horses and ourselves suddenly sank into deep morasses of snow and slush, they up to the girths and we above our knees. At the same time there was nothing on the surface to indicate these frequent pitfalls. It was very evident that the ice was breaking up and letting the sea-water in through the cracks, aided by the spring tides. The ponies are quite helpless in boggy slush, and simply lie and flounder, and we had to drag them out by hand and with lines round their necks, and the sledges one by one, while we were wading about in slush above our knees, only to get into similar difficulties again a few yards ahead. I went in front with a long-handled ice-axe, sounding and trying to pick a road; but before long there was no choice, and we had to drag the ponies and sledges through it as best we could. Fortunately, we were three able-bodied individuals and in perfect health, or otherwise we should have looked very foolish."

On May 3, when in lat. 81° 19′ 30″ N., long. 54° 53′ E, after having been camped for two days for the gale and driving snow to moderate, the thermometer rose to 2° degrees above freezing-point. At the same time, there was every indication of open water both to the north-west and the north-east; looms were flying in great number in these directions, and distinct water-skies appeared. Mr. Jackson became anxious about the ponies, as, in the event of the ice breaking up under their feet, there was little chance of his being able to save them. And he had already proved their great value for taking heavy loads over firm ice. So it was determined to retrace their steps while it was possible, and return northward by boat after the departure of the ship.

"As events turned out," writes Mr. Jackson, "we did not start back a moment too soon, and although we frequently marched thirteen and fourteen hours a day, and did not camp even for the worst weather, we had a very close race with time, and only just won with dead-beat ponies. On May 5 the black pony broke through the ice and nearly disappeared. Fortunately, he did not struggle until I had passed the reins round his neck, or he would have gone altogether. Eventually, the three of us managed to haul him out on to the ice. Often we had to drag the six sledges ourselves, having got the ponies through particularly bad places on in front, and going over the same ground twelve and fourteen times. Occasionally we would come to sound ice, and go ahead briskly again; but it did not last long, and the old entertainment of hauling the ponies out of the bog and pulling up the sledges soon began again.

"I at last tried snowshoes (we had left the Norwegian ones at a depôt, owing to their weight) of empty oat-bags, with a little hay in the bottom, tied round the ponies' feet, and this I found helped to keep them up. It gave them a most gouty and ludicrous appearance. But, to cut the yarn short, we did bad luck in the eye, and got them back dead beat, but all right, in the early morning of May 13, having travelled 310 miles."

From another letter to Mr. Harmsworth, I take this passage as referring to the foregoing journey.

"The conclusions I have come to, as a result of our trip, are these: 1. That horses are *the* means of reaching a high latitude from this direction. 2. That sledging can only be done early in the spring, and that horses or ponies should not be out after April 30 (if they are to be used again), owing to the very early break up of the ice here. 3. That only a driving pack will stop our advancing a considerable distance further northward."

What, you will now naturally ask, has Mr. Jackson discovered in Franz Josef Land? and before I reply I must say this. Mr. Jackson has purposely retained his detailed geographical and scientific reports, his maps, his collections. He says that he sends back nothing until next

year, in order that everything may be most carefully checked and tested. And that is why I cannot show you to-night any geological, botanical, or other specimens. The only examples of the vegetation of Franz Josef Land which have reached us were contained in a small box of flowers sent by Mr. Jackson to Mrs. Harmsworth. But in the course of his letters he touches upon the geographical character of his line of march, and it is from these notes that I am able to say that he has already done enough to altogether alter our present ideas and maps of Franz Josef Land.

Beginning at the south, then, I may say that Northbrook and Hooker islands appear to be much smaller than hitherto has been supposed, and their coast-lines have been to a large extent altered. The trend of the west coast of Northbrook island, for example, is north-east instead of north; Gunther bay has been much altered in appearance; Nightingale sound is very different, I understand, to what it has been thought to be; and not only does Markham sound undergo considerable modification, but the coast of such land as abuts on it differs entirely from the description given by Payer, who, I should add, only viewed it from a considerable distance. Mr. Jackson has not, it seems, travelled one yard in Payer's track; but as he has actually traversed what Payer only looked at as a distant view, and has, moreover, carefully mapped every mile of his route, we may safely rely upon his conclusions.

But if you will turn to Payer's map—the only one which has ever been made of the interior of Franz Josef Land—you will see that Zichy Land is laid down as a mass of land abutting on the northern side of Markham sound, and extending indefinitely to the north and north-west. He described it as "a vast mountainous region." I believe I am justified in saying that this Zichy Land has no real existence; that where *terra firma* has been placed in that map, there lies the salt sea. Mr. Jackson marched north across that blank space, and marched all the way upon sea-ice. Neither was there sign of any land-mass to the north, west, or east of him. The coast of Zichy Land becomes a group of narrow islands, lying roughly north and south between Mr. Jackson's route and Austria sound. Alexandra Land, too, disappears as a large mass, and becomes a group of islands. In other words, Mr. Jackson has discovered another Austria sound; another channel leading north between groups of islands; another road for sledge-travel, as long as, but only as long as, the ice keeps firm and sound.

Mr. Jackson had reached 80° 36′ 20″ N. and 53° 4′ 37″ E., the northern point of a small island at the northern entrance to Markham sound, on April 26. From this point of view he could see no mainland to the north, and between that and his furthest point (81° 19′ 30″) no mainland was to be seen towards the north. But there was this: two or three small islands away to the north-west, probably Oscar Land; westward, two large distant islands—in other words, as I believe, Alexandra Land; to the north-east several large islands, having bold coast-lines, and

rising to some height—that is to say, Zichy Land. Richthofen peak, described in some detail by Payer, who viewed it from Mount Brunn, in the south-east of M'Clintock island, is now, I understand, not to be found in the locality allotted to it. Mr. Jackson camped within a mile of the spot in clear weather, and he states that there is not a mountain to be seen, or anything approaching to one, north, south, east, and west, in that locality.

Once again I repeat that Payer himself has thrown doubt on his own mapping of this portion of Franz Josef Land, owing to the distance from which he surveyed it, and the weather in which his observations were made; but while, in endeavouring to obey our President's wish and give you some account of the geographical results of the Jackson-Harmsworth Expedition, I have drawn on Mr. Jackson's private letters, I would desire to emphasize the fact that he has purposely refrained from sending any map or report until everything has been gone over carefully, checked, tested, and placed beyond all reasonable doubt.

It is in this spirit of careful and scientific accuracy, and with his own natural energy and powers undiminished, that, a day or two after the ship left Franz Josef Land this last July, Mr. Jackson sailed north along leads of open water in the specially rigged and equipped boat, the *Mary Harmsworth*. For the results of this journey, and of the sledge-journey next spring, we must wait until next autumn, when we shall hope to again welcome the *Windward* home, and with her, too, another and even more important budget of news—news of discovery, news of success, and, best of all, news of well-being and good health.*

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* Although no geological specimens have been sent back by Mr. Jackson, a few rocks came back on board the ship, and these Mr. F. W. Rudler, of the Museum of Practical Geology, has most kindly examined. I submit his report:—

"The geological specimens from Franz Josef Land include a large number of pieces of chalcedony and quartz, passing in certain cases into agate, and apparently derived from geodes in basaltic rocks, such as are known to exist in Franz Josef Land. There are also some small pieces of a radiated zeolitic mineral (natrolite), from a similar source, and several masses of crystalline and columnar carbonate of lime, of yellowish-brown colour, like that of sugar-candy. The collection comprises a great number of fragments of argillaceous limestone showing 'cone-in-cone' structure, and some small pieces of septaria. It is notable that one characteristic piece of flint is included in the collection. Such of the specimens as contained fossils were handed over to Mr. G. Sharman and Mr. E. T. Newton for determination.

"The specimens from Franz Josef Land include only a few fossils, and the most conspicuous of these are pieces of silicified wood, which are of considerable size (8 or 10 inches long, and perhaps half as thick), and of a creamy white colour externally, while the inner parts are nearly black; the outer white coating has doubtless been caused by long exposure to the atmosphere. The state of preservation varies in different specimens; in one example (No. 1) the minute structure is perfectly retained, and under the microscope shows most clearly the lines of growth, the medullary rays, and above all the 'clotted tissue' characteristic of coniferous wood. This wood is completely silicified, but the silica is in a very unusual condition, and Mr. J. J. H. Teall, who has examined the section, speaks of it as a *micro-crystalline quartz*, the crystals of which

After the reading of the paper, the following discussion took place:—

The PRESIDENT: We have heard from Mr. Montefiore a very full and interesting account of the procedure of the expedition up to last July, and I think that Mr. Harmsworth, whose great public spirit and munificence are fully appreciated by his countrymen, has every reason to feel satisfied so far. Everything has been done which was intended to be done up to the end of the season, and done well. There appear, with the exception of the unfortunate detention of the ship, to have been no mistakes and no drawbacks. Many interesting questions arise in connection with these proceedings of the expedition. I think Mr. Montefiore has well pointed out that Mr. Leigh Smith was able to place Franz Josef Land in a more favourable light than the Austrian Expedition did, finding a large supply of animal food of various kinds, and also discovering many birds which had not been seen before, and their places of breeding, which was important; and Mr. Grant, I think, in one walk doubled the flora of that vast region. We may, therefore, expect that Mr. Jackson, with more time at his disposal, and traversing a larger area, will add still more extensively to our knowledge. I think it very important that it should have been found that one of the two great land-masses of Franz Josef Land apparently does not exist at all, which entirely alters our ideas of the distribution of land and water. It is an important geographical fact, and I think it is also important for another reason—because we are glad to find that our countrymen, instead of being disheartened by having to follow the track of Payer for 150 miles, can commence with new work and new discoveries almost from the moment that they leave the ship.

There is another point connected with the disappearance of this assumed land, which strikes me as important, and that is, the question of the origin of the great

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show no relation to the structure of the wood, but cut across the cells and are cut across by the woody tissue in an independent and very remarkable manner. Another specimen of the wood (No. 3), which is as completely silicified, but with the cellular structure almost obliterated, has the minute quartz crystals in a somewhat different condition, many of them being more or less radiated.

"Among the specimens are some pieces of a coarse calcareous grit (No. 4), including a large proportion of wood and other plant remains, probably coniferous, but for the most part too much altered to speak of with certainty.

"One fragment of a *Belemnite*, with part of the cone-cavity preserved, serves to indicate the presence of Secondary rocks, but is insufficient to afford any closer idea of its age.

"On a slab of calcareous shale there is the impression of an *Ammonite* with rapidly enlarging whorls, and fine ribs which bifurcate about the middle of the side. This specimen most nearly resembles some of the varieties of *A. macrocephalus*, but there are differences which prevent its being referred to that species; it has apparently been derived from the Middle Oolites, but the close resemblance of some of the Lower Cretaceous *Ammonites* to Upper Jurassic forms raises a doubt as to the age of this Arctic fossil.

"Cretaceous beds with coniferous plants and strata of Oxford clay age have been recognized in Franz Josef Land by Payer (see note by Mr. Arthur Montefiore, *Geographical Journal*, vol. iii., 1894, p. 495)."

The flowers sent home by Mr. Jackson to Mrs. Harmsworth were picked at Cape Flora and put into a box without any special reference to their scientific interest. Mr. G. S. Boulger informs me that they included *Ranunculus nivalis* (the snow-buttercup) and *Saxifraga oppositifolia*, a purple saxifrage. These specimens were in full flower on June 30.

icebergs reported by Payer and Leigh Smith. We must now, I suppose, assume that the glacier of Wilczek Land, 100 miles long, extends very much further to the eastward, and I should almost be inclined to expect another large mass of land towards the north-west. There are many other questions connected with the equipment and the mode of travel, as well as many geographical questions, which are well suited for discussion, although we must remember that the paper is derived from private letters, and is not an official report. I see a good many Arctic officers here, who, I dare say, will be willing to criticize and offer remarks. I see Sir George Nares, Admiral Markham, Captain Beaumont, Captain Parr, Dr. Neale, who went out to Franz Josef Land, and other eminent Arctic officers hiding themselves in distant parts of the room. I wish they would come forward.

Admiral Sir GEORGE NARES: I am sure we are all very much pleased at learning that Mr. Jackson and his party have been landed in the position in which they wished to be landed, and where there is a large field before them for interesting research. We must not, as Mr. Montefiore has shown us, criticize now; we must await the official reports. There are a few points which have been alluded to on which I think I might dwell. First of all, the expedition has undoubtedly fulfilled our experience of the difficulties of reaching Franz Josef Land, which must not be entertained lightly. Instead of voyaging to that region and returning in one season, the ship, as we expected, was not able to do it. I mention this, not to clog further work, but to show that Arctic expeditions, as we advance farther and farther north, require more and more experience and care. I think the captain of the *Windward* deserves great tribute for his successful navigation of the ship to that point and back again. Now, as to Payer's Land. It is all very well for us to correctly lay down land from our ships, but it is more difficult in sledge journeys, with an imperfect knowledge of our surroundings. I may mention that my expedition in '75 was fitted out by Great Britain on the hearsay of, not Captain Hall of the United States Expedition, who preceded us, but what he was supposed to have seen 150 miles to the northward. I think it is very likely that my expedition would never have been sent except for that report. Now, here we have found that Payer's reported land, 50 or 60 miles to the westward, does not exist. I am perfectly certain that Payer's observations were founded upon facts, and when he charted mountainous lands for islands, and called them a continuous land, he must have every allowance. He worked much in the same way as Mr. Jackson, mapping us out the district which he journeys over, within a reasonable distance of his line of route; I dare say he, also like previous sledge travellers, will see in the distance other lands, of which he will give us vague accounts. Mr. Jackson is specially placed in about the most unique position that any explorer could wish to be placed in. Franz Josef Land, up to the present, has been in this position—that the migratory birds journey there three or four weeks earlier than to any other parts of the Arctic Regions, which is a proof positive that there is open water, and, in consequence of the open water, something for them to live upon. There is also seal, and bears feeding upon the seal. To give you the idea of the difference of aspect of such a position, you must remember that where the *Alert* and *Discovery* were, we never saw a bear, because we never saw a seal; we never saw, therefore, any water. Now we are exploring a position not very much farther south, and I hope Mr. Jackson presently will give us a good account of it. Well, in conclusion, I am sure we must all appreciate the position that Mr. Harmsworth jumped into. There was Mr. Jackson willing to go and daring to go, but where were the funds to come from? Mr. Harmsworth has, in a patriotic and generous spirit, which deserves everything we can say of him, come forward. We thank him most heartily,

and we also give our tribute to Mr. Montefiore and those who managed the expedition.

Admiral A. H. MARKHAM: I had not the most remote intention, when I came into the theatre this evening, of taking part in this discussion, and I now only rise at the express invitation of the President, although I am afraid that I have very little to say that will interest the meeting. I do not think we are yet in a position to criticize the geographical work that Mr. Jackson has already accomplished. I am of opinion that we should reserve our criticism until that happy day when Mr. Jackson returns to us. I have, in common with every one here to-night, listened with a very great deal of interest to the excellent account that Mr. Montefiore has given us of the Harmsworth-Jackson Expedition. Our thoughts have, I am quite sure, been with Mr. Jackson and his brave companions during the long winter that has passed, and I candidly confess that, so far as I am concerned, those thoughts have been tinged with a certain amount of anxiety in consequence of the protracted absence of the little *Windward*, an anxiety that was not relieved until I received a telegram, which Mr. Harmsworth kindly sent to me in Scotland a few weeks ago, announcing her safe arrival in Vardo. From what we have heard to-night, we learn that the members of the expedition have not, on the whole, passed an unpleasant winter, and that the spring and the summer have not been altogether unprofitably spent. I dare say there are some amongst us this evening who would have been more pleased if we could have heard that the explorers had crossed the threshold of the unknown region, and made new discoveries; but if there are, I can only advise them to be patient, for, from what we have heard to-night, we know that Mr. Jackson is advancing in a careful and methodical manner, by laying out his depôts before him in readiness to make an extended journey, which I presume he will do next year; and I am quite sure when, as Sir George Nares just now said, we do get intelligence from Franz Josef Land again, we shall hear of great geographical successes. From what I gather from the paper this evening, the difficulties that I predicted in a paper that I had the honour recently of reading to the International Geographical Congress, have already been encountered by the explorers. I allude to those difficulties attending travel during the summer months, when the snow is of a soft and slushy consistency, and the disruption of the ice has commenced; more especially will these difficulties be found to exist in the vicinity of glaciers and fiords. Mr. Jackson has no doubt realized these difficulties, and will, I am sure, by an early start next spring, and a return again before the summer is too far advanced, overcome them. It is satisfactory to know that there is an abundance of animal food, as we supposed would be the case from Mr. Leigh Smith's expedition, and I attribute to this fact the perfect immunity which the members of the expedition who lived on shore enjoyed from scurvy. I am not sure—perhaps Mr. Montefiore will tell us—whether the crew of the ship lived on board or in huts during the winter. [Mr. MONTEFIORE: On board the ship.] I thank Mr. Montefiore for the kindly allusions he has made to me in the opening part of this address, and I sincerely hope and trust Mr. Harmsworth's confidence in my writings will not be forfeited by the results which I hope we shall hear next year of Mr. Jackson's enterprise.

Dr. W. H. NEALE: I have very little to add, except to congratulate Mr. Harmsworth, and am very glad to have heard that his expedition has done so well where Mr. Leigh Smith and I passed the winter with twenty-five hands just fourteen years ago. We lived in a hut, after losing our ship, on fresh meat, without any lime-juice. Our breakfast was bear and walrus, our dinner was walrus and bear, our tea was bear and walrus for ten months, during which time we had no lime-juice at all, and no sick men amongst the party; and I always say that if I were in the

Arctic Regions again, I would sooner build a hut on the shore, and live there than on the ship. I think that Mr. Jackson's expedition proves that. The crew had more or less signs of scurvy before leaving the land; two succumbed on the voyage home; one died during the winter. I am glad that Mr. Leigh Smith's plans have been followed up, and in a year or two we shall be able to congratulate Mr. Harmsworth on seeing Mr. Jackson return. I don't believe he will do it in one winter, and should not be a bit surprised if he finds he is obliged to give up his present route and work along the edge of the land to the north-west past Cape Lofley. He is getting into a mass of islands and open water, which will give him no end of difficulties, instead of keeping near the edge of the land, which I expect, during the summer, he will find himself obliged to do. I have much pleasure in thanking Mr. Harmsworth for some relics Mr. Jackson has sent home. I have got my old stethoscope and camera, which have been frozen up for thirteen years, and are in perfect condition.

The PRESIDENT: Our gallant countrymen, now in Franz Josef Land, are about to enter on their second winter, I am sure with the same enthusiasm and the same determination to do their work well as when they left these shores. We cannot but all feel very strong sympathy for them, and I only wish that our sympathetic feelings could be conveyed to them as a Christmas greeting, but this is not possible. I am sure, however, that the meeting will desire me very warmly to congratulate Mr. Harmsworth, and to tender your most hearty thanks to Mr. Montefiore for his most interesting paper.

NOTES ON A JOURNEY TO SOME OF THE SOUTH-WESTERN PROVINCES OF SIAM.*

By H. WARINGTON SMYTH, LL.B., F.G.S., of the Royal Department of Geology and Mines, Bangkok.

III.—WEST COAST PEARL FISHERIES.

Pearling in the Mergui archipelago has been carried on for a long time by the Selungs, a primitive people very like the Orang Lauts further south, who cruise about among the islands in their boats, and have no more fixed abode than the snug anchorage they moor in during the south-west monsoon. As a result of their fishing, most of the banks down to 6 fathoms, the deepest to which they dived, have been well cleared of shell. The fishery could only be carried on for one or two hours at low water springs, some five or six days in the month, while for six months during the prevalence of the south-westerly winds all fishing stops, owing to the thickness of the water. The discovery of the Pawe bank in 1891 gave a great stimulus to the fishery, and the output of pearls rose in value to half a lakh. Most of them were small, the larger fetching Rs.50 to 100 in Mergui, and some

* Paper read at the Royal Geographical Society, January 28, 1895. Map, p. 496. Continued from p. 421.

20,000 mother-of-pearl shells were exported to Penang, valued at Rs.40,000 to 50,000.

The coast-line was subsequently divided into five geographical zones or blocks, and the blocks were put up to auction for a term of three years, with right to collect pearls, pearl shells (or mother-of-pearl) over 6 inches from heel to tip, and bèche de mer.

No. 1 extended from the north end of the district to south of Tavoy Island and Great Canister to Mergui, south of King Island, and north of Merghi, Lloyds, and Chester Islands.

No. 2. South of the above line to Whale Bay, south of Kissairing, Domel, and Maria Islands.

No. 3. Thence down to Forest Strait, and south of Collins and Forbes Islands.

No. 4. To south end of Sullivan Island.

No. 5. South to the St. Andrews group.

Pumps, diving-dresses, and Manilla and Japanese divers were introduced with success, and the first season, November, 1891, to August, 1892, was so successful that a number of pearlers from the North Australian banks visited the fishery, and a dozen of them remained to work on the banks, with the result that there are now sixty pumps at work, of which thirty are in Block No. 3, in which the Pawe bank occurs, and which has so far proved the richer. Small schooner-rigged or native Burmese boats are used for the pumps, and for moving about from place to place, a larger vessel acting as depôt.

The block lease system has given rise to a number of difficult questions, and has not proved very satisfactory in actual practice, and when the present leases are up the Australian plan of a fixed licence per boat and pump will probably be introduced both in Mergui and Tavoy waters, a fee of Rs.500, with a reasonable royalty of about Rs.25 per ton of shells, being probably charged.

Pearling expenses are heavy, as may be seen from the following list:—

Pump from England	£140
Crew pumping, each man per day	Rs.1
Diver, wages per month (advanced)	Rs.42–45
„ per ton of shells	£20
„ food per month about	Rs.25
Tender, all found, and per month	Rs. 70–80

Two dresses last about a season (six months), and four lengths of pipe are in Mergui waters an absolute necessity. Shell last season (1893–1894) averaged £70 per ton, and each boat averaged one ton per month of fourteen days' work, and 520 shells averaged one ton. The real profit is made only on the pearls, and among these in one season very few real gems are found. The best last season were

three of 49, 42, and 35 grs., of which the second, being round, was the most valuable, and the smallest, being button-shaped, the next. It has been calculated that a pearl is found to every fifteen pairs of shells, and that the average value is Rs.6 per pearl. Many of them are, however, the so-called "golden pearls," with a yellow amber tint, for which there is no European market, although the Chinese and Burmese prefer them to the white.

Diving with dresses now goes on as deep as 18 to 20 fathoms, but they all say that 22 fathoms in Mergui waters is harder to stand than 25 in North Australian water, and a number of deaths and cases of paralysis due to the excessive air-pressure on the brain have occurred from this depth being exceeded. The sickness comes on with drowsiness after the man has been up some ten minutes or so; sometimes it passes off, but a repetition of a deep dive is always dangerous. It is a rule to take nothing before going down unless it be a cup of tea. The intemperance of the Manilla men helps the sickness, and is one reason why Japanese are preferred. The Burman is much too lazy and too fond of stealing. We met one Siamese diver who delighted in spinning yarns of his under-water adventures, and evidently enjoyed the life immensely.

Divers are often accused of opening shell to look for pearls under water, but it is very doubtful if they do so. Delivery of shell has to be taken from the boats at least twice a day, however, for if the shells remain long in the boat, the men put them in the sun until they open, and then run a stick round in search of pearls, the best of which are generally on the rim; they then give the fish a drink of water, and he closes up again. As it is, the divers make plenty of money, and spend it, as a rule, as recklessly as such a class usually does. The pearl oysters (*Avicula* (*meleagrina*) *margaritifera*) are usually packed and piled in sharp rough ridges on the rocks, and lie in places where they get some protection from the stir of the south-west monsoon, always with an island to the westward of them. Another shell, called by the Siamese "sabula," is very thin and transparent, like mica, and grows on mud flats at about the level of low springs. The average life of the former is four years, and when two years old they are in best condition.

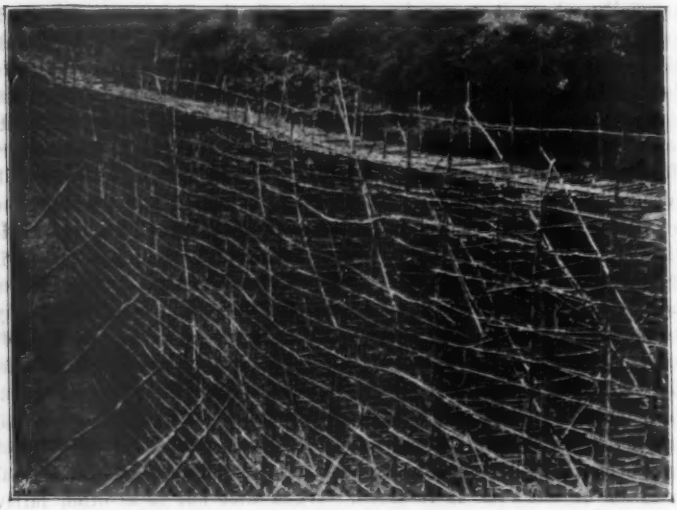
The successes on the Mergui banks encouraged search in other parts of the Bay of Bengal, and shell has been found in the Andamans, Cocos, and in Siamese waters in the Kopa inlet. This, however, is the only place on the Siamese coast where a margaritifera has been found, although likely spots abound. There was a small output last year of 3000 pairs of shells, but the pearls have been mostly seed pearls, and of these only fifty were found. The bank is a shallow one, with 6 to 9 fathoms of water. These shallow-bank shells are found to be pitted and patchy and full of holes, the only market for them being among the Chinese.

IV. Tin Provinces on the West Coast.

Puket, or Tongka, as the Chinese call it, which we reached in April, is the chief of the Siamese western provinces, and is almost exclusively inhabited by the Chinese, who are attracted by its tin, and who have settled all over the peninsula wherever tin is to be worked or pepper and pigs can be reared. Their methods of working the alluvial deposits have been so often described, that I shall only refer to the hill workings, to which they resort more and more now, as the gravels and clays of the valleys get worked out. The granite in certain places, more especially where it comes in contact with the red micaceous sandrock generally found lying over it, contains the small black tin crystals disseminated through its mass as one of its essential ingredients. In the north and western Naitu hills rich patches occur, as a rule, close to the junction of the two, especially where the granite sends its veins and strings ramifying through the older rock. These veins are often followed by the miners to some distance, and the gashes in the hillsides which are the result of their work are often 15 fathoms deep, and are visible for miles. The further from the contact, the poorer as a rule will be found the granite. Further east, although the red rock is present, giving to the streams a colour deep as that draining from the Cornish mines of the St. Just district, the best tin is not by any means always found close to the junction, and it often lies in soft quartzose veins running through the harder surrounding granite. The overlying rock is often very much altered near the junction. In places it becomes a grey micaceous schist, in others it is metamorphosed out of recognition; some has been included by and almost transformed into the granite, while a few feet higher up the normal condition of the rock is resumed. When first cut it is often fairly hard, but a season's weathering reduces it to a sticky clay.

There seems to be no great thickness of this capping over the granite, owing to the amount of denudation which has taken place; and, indeed, by this agency it would seem that enormous deposits have been obliterated all through these provinces. In some localities, as above Sitam, there are veins, with a fairly defined foot-wall running through the granite in a north and south direction, with a steep westerly underlie, composed of very kindly looking "gossan," and carrying dark crystals of tin. These veins, however, do not seem "strong," and soon pinch out, while a foot or two away, east or west, another vein will come into existence, and in turn will split up into small strings, or give out in a short distance. The ground is thus very confused; the whole mass is soft, and to a great extent decomposed, with hard zones running through it. The Chinamen work it down with their cross-bars, and knock out the tin leisurely with their hammers, with true Celestial indifference to the flight of time. In working most of these deposits, they show

even more than their usual ingenuity and perseverance. Water is collected at suitable heights miles away, and led in leats winding along the hillsides to the points required, and in aqueducts of primitive but efficient construction across the chasms and gullies. At one place, known as Taw Sun, such an aqueduct leads the water, at a height of 65 feet from the floor of the gully, for a length of 200 feet. It is built entirely of hard woods from the jungle around. They are in short pieces, which are spliced together, and lateral stays of giant bamboos are used at the sides. It represents an enormous amount of



TAW SUN AQUEDUCT, PUKET.

labour, first in cutting and transporting of the wood, and subsequently in lashing and fitting *in situ;* and every season before the rains it has a thorough overhaul, a gang of men living on the spot some weeks to effect the work.

Walking along these for 6 miles at a time, one goes through dense forest, or among the huge gashes of old workings, now covered with a thick homelike growth of bracken fern. Below, down the hillside, a stream of water will be seen playing on a great white mass of decomposed granite, which is rapidly crumbling before it and the strokes of two or three men, perched like Welsh quarrymen on some insecure footing, and plying their long iron-shod pikes on its face. The stuff as it goes down is carried into a leat, sometimes of wood, sometimes cut in the solid rock for 100 yards, with a gentle gradient in which

more men are raking over the running water and helping the tin to settle. Some of these are 10 feet deep, and when it is chock-a-block the water is turned off, and 10 feet of black tin is shovelled out! As may be imagined, the amount of the tailings is enormous. At the mouth of every little stream, where it emerges into the valley below, a wide fan of detritus is deposited, spreading its glistening surface of mica quartz, schorl, and hornblende particles further and wider with every season's work. The finer stuff still goes on down the valleys, and has in twenty years changed the inner harbour at Tongka from a snug port for craft of several hundred tons into a series of shallow banks, which nothing larger than boats can cross, and which extend for a mile out into the bay.

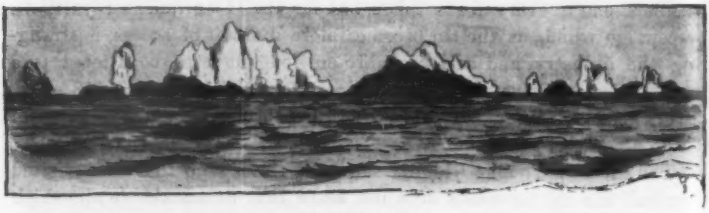
The smelting is mostly done in Tongka, the tin going down by buffalo-carts, and when ready for export to Penang each slab averages a little less than 90 lbs. From these slabs, as they are weighed out at the Customs, one in every six is taken out for the Government royalty—a percentage which, as the tin becomes more difficult of access, is strangling the industry, and will probably ere long have to be altered to a more moderate figure. The total export for 1893-94 was 63,978 slabs, or 42,783 picul (over 2540 tons), which sold for an average price of $34 to $35 a picul in Penang.

The town of Tongka literally smells of tin. Who that has visited Cornwall and its tin-mines does not know that unmistakable air which comes off granite, and especially decomposed granite, rocks, or off the dressing-floors of a tin stream work? It greets you when you land at Tongka, at Renong, at Takuapa, at Ponga, or at Maliwun; but any visions which arise in the mind of a colder clime are quickly dispelled by the tall groves of cocoanut palms which flourish on the heaps, or, less pleasant, by the vicious charge of a loose buffalo. Circumstances kept us among these sights on and off for the best part of a month, and I often wondered what an inspector of mines at home would say to see the Chinamen working pits 30 feet deep under the roads, or engaged in breaking heads over some question of water-rights.

In the province of Gerbi (or Bi, as it is locally known) areas have been taken up for the purpose of exploiting the outcrops of lignite which occur in several places, and in our visits to these localities we had opportunities of seeing something of the wonderful series of inland waterways, which extend from the Muang, or township of Gerbi, on the north, right away to Trang, and beyond, on the south. The whole coast-line inside the outer islands consists of mangrove swamps. Here and there a low hill rises above the rest, and at its foot a Malay village lies, and the people come off in their long canoes, arrayed in sarong and kriss, to pilot you to your destination, or have a yarn and some tobacco. The mouths of the rivers are often flanked by spotless stretches of sand, where the wind sighs through the Casuarinas, which

love to cluster near the foam of the surf, and add their gentle moan to its dull roar. What struck one most, coming from Siamese scenery, were the open spaces upon the hillsides covered only with Lallang grass, and otherwise open to the sky—the remains of the industry of former times. Similar in their effect are the bleak cliffs of the western-most points of Junk Ceylon Island and the coast northward, swept by the driving gales of the monsoon, bare of vegetation, and backed by a stunted growth of gnarled underwood—so natural and homelike to the northern eye.

To reach Trang, we went along the coast outside in preference to the intricate inland waterways, and met a fine western sea rolling in on the beam. The monsoon had burst with a gale of wind, which kept our little craft riding for a couple of days in Paklao river, with two anchors and 15-fathom chain ahead, and it had now hardened down into a



IN GERBI BAY.

topgallant breeze. We got into Trang river at night, but, with the aid of the marks lately put down by the Rajah, we were able to go right up, with the long musical Malay calls of the leadsman echoing back to us off the trees. Trang's great industry is pepper, of which it exports some 60,000 picul a year, at a value of some $485,600; and Palean to the south, which is also under the Rajah of Trang, exports about 3700 picul. But the growers are complaining bitterly of the present poor prices, and find that with pepper at $8 a picul instead of $25, with roads to maintain, and a royalty of $0.60 a picul, profits are looking small, and labour has been reduced one-half on all estates. There are now only some 10,000 Chinese in the Tapting district. This means a large coolie emigration, which takes place chiefly to Perak and other protected states, where every form of inducement is held out to industrious immigrants, and the proximity of which is a menace to the future prosperity of Trang, Puket, and all the western Siamese provinces, where Chinese labour has been the developing power. What they want still is population, and the state that holds out the most liberal inducements will go ahead. That the Chinese coolie is tolerated anywhere, and even sought after, shows how the money-making spirit will distort men's notions. I confess to great sympathy

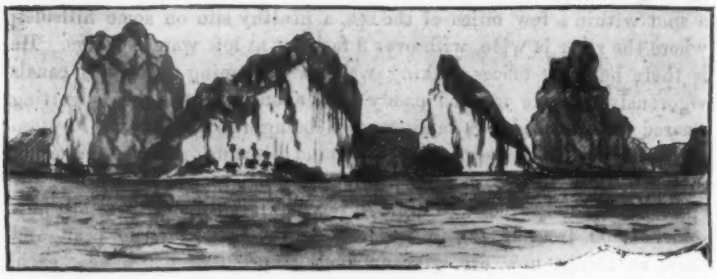
with that quiet gentleman, the Malay, who sees his fair lands invaded by hordes of these pork-breeding barbarians.

The Trang exports include 6000 to 7000 squealing pigs, 70 to 80 tons of tin, and some 3,132,000 attaps, which are made all down this coast from the dunny palm for roofing purposes, and largely sold in Puket, Penang, etc. They pile them high in the small junks, till they look like hay-barges on the Thames. The Rajah, Phya Rasadah, who is well known in the straits for his enlightened views, is striving hard, by making roads, instituting police-courts, and introducing something akin to the village system he has seen working so successfully in Burma, to fight the counter-attractions which are held out by the protected states to the southward of him. He did a bold thing two years ago in moving his capital from the old town of Kontani, down river to Kantan, a spot within a few miles of the sea, a healthy site on some hillsides, where the river is wide, with over 2 fathoms at low water springs. He is there building offices, sinking wells, and opening roads and canals vigorously. There is good paddy land about, and this he is getting cleared and drained. A main road is being run through to Kontani to connect with the pepper district round Tapting, and the tin-mines inland. As a reserve, he is encouraging the planting of nutmeg by twenty and thirty trees at a time in the plantations, and there are now some 10,000 trees in the ground. They take six years to bear, and then, as things now are, give an average profit of $20 a year each. If he can continue this policy, Trang will yet vie in material prosperity with its southern rivals. The country is not lacking in all that is counted wealth in Malaya, and it has more than its share of fertile plain-land. As the map shows, the great axial range is at this point much less important, and its lateral spurs are insignificant.

It was our fortune early in May to begin our return journey, by way of Ponga, in the top of Junk Ceylon bight, very heavy weather preventing our going to Takuapa, for which we were bound, by sea. The people here are essentially Siamese, there being much less of the Malay or Chinese elements; but they still have the nasal accent, which is noticeable in the Siamese-speaking people of the peninsula, and which reminds one of nothing so much as what is termed the Yankee twang. Our eyes were again gladdened by the yellow Buddhist robes and the gleam-points of the white prachadees (or pagodas), and Master Cheerful's spirits rose as he contemplated the beautiful black teeth of the damsels, which I, poor Philistine, was apt to consider atrociously hideous.

The uniqueness of Ponga depends upon its limestone peaks, which form the characteristic of the northern end of the bight, and stand in sharp points and steep precipices out of its waters, some more than 1500 feet in height. They have a perceptible dip to the southward off the

sharp granite ridge of the Khao Dau Mawk Lek range, which forms the frontier between Ponga and Takuapa. Beneath them nestles the little town, its homesteads scattered among the areca palms, the elephants musing among the bamboo shoots. Above, while we were there, roared the south-westerly gale about their summits, and the wild whisps of low cloud clung upon their shoulders. The Rajah, who is now an invalid, has been long known as a courteous and efficient ruler in his little state, which, quite cut off from the outside world, enjoys a certain wealth in elephants, rice, betal, and attap, and has an air of peaceful prosperity and content. The trail across to Takuapa goes up the Ponga river almost to its source in the northern granite range already mentioned. A few small hill workings contribute some ten



THE ENTRANCE, PONGA RIVER.

tons of tin a year, and an enormous quantity of tailings, which have played havoc with the stream.

The first night we stopped our elephants at Ka Ngawk, a dirty Chinese village, and next day, crossing the hills, we descended by a rough trail among huge granite boulders and old tin-workings to Kapong, a dirtier Chinese village. This is fairly in the province of Takuapa, and did not impress us favourably. There was no monastery near by and no sala to stay in. The house in which we were accommodated was one of the usual mud-floored, low-walled erections in which the Chinamen usually store themselves and their pigs. Some of us were fain to sleep in the roof, but even there did not evade the smells; those below had to contend, *inter alia*, with the advancing water of the neighbouring stream.

The Siamese style of building on piles is without doubt far more cleanly and efficient for these countries, and the large raised floor outside the houses gives dry resting-place for men and baggage in the highest flood. A Chinese street, too, choked with every man's and his neighbours' offal, is absolutely impassable in rainy weather. The Siamese, on the other hand, live scattered among their gardens, and if the ground is underwater, it is at least navigable, and the canoe is not in danger

of running on the sunken shoals of the neighbours' ever-increasing dust-heaps.

From Kapong we reached Takuapa in dug-outs next evening. The river is a mere stream, but, being in flood, the boats could float. The forest is very dense all the way. The tin nearly all goes down into the town on elephants, often 30 or 40 miles on very rough tracks. Next to Puket, Takuapa is the largest tin-producer along the coast, but its total does not much exceed 600 to 700 tons a year.

The mines are known under three separate heads:—Mueng Karar, worked for six months in the year, being dependent on the rains for water; usually small, with only two, four, or six men. Mueng Len, hill open cast workings, not dependent on the rains, where washing is done every fifteen days or so, as sufficient stuff is cut down. Mueng Karsa, the usual large open workings in the alluvial, where the washing is done from day to day, and large numbers of men are employed. Water-sources and waterways, rights of way, and boundaries are in a grand state of confusion for the most part, and claims and counter-claims result in lengthy and unsatisfactory lawsuits, of which the most tangible result is generally a row and some broken limbs.

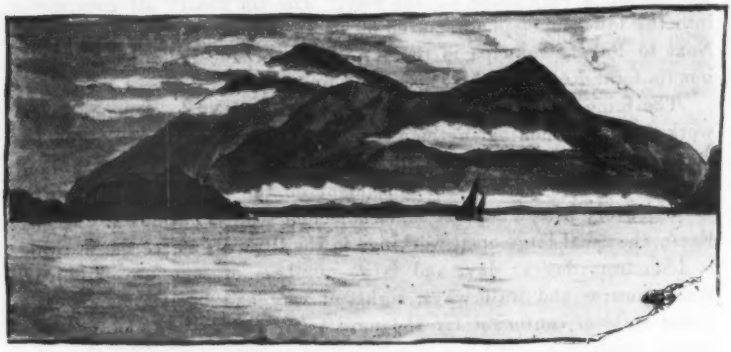
At the town the tin is smelted, stamped, and weighed, and the royalty deducted ready for the monthly steamer. It then goes down to the estuary where the steamer lies, in long badly shaped boats, which carry one big China lug. In the floods they are often two days returning to the town, a distance of some 14 miles.

We witnessed a remarkable sight one evening in the estuary—hundreds of huge bats (Pteropus) passing overhead for some twenty minutes, going east towards the gardens of Takuapa for their nightly raids upon the fruit. They flew very high, apparently 600 feet up, and very slow; and were scattered at intervals of some hundred yards all over the sky as far as the eye could see. They evidently came from the outlying hills on the coast-line.

The estuary has a lot of sandbanks and sunken rocks which are unmarked, and make an awkward place for strange craft; the southern entrance has only two fathoms on it, and is flanked by long banks extending many miles out to sea. The strong tides and heavy sea always running on these banks, the roar of which will travel 6 miles up the estuary, together with the absence of well-defined landmarks or buoys, make it a dangerous entrance at best. Its only advantage is to save three hours' steaming for vessels bound in from the southward, which would else go round by Kopa Head on the north. A clearing has been made, and machinery is out for a lighthouse on that head, and it will be a great advantage to the port.

It is curious how comparatively few craft one sees along this west coast even in fine weather. A few Penang junks, whose remarkable feature is the clumsiness of the sterns, some two-masted Burman boats,

an occasional double-tailed sampan, with her foremast raking like a bowsprit, or an Orang Laut boat, with her horizontally seamed dipping lug. The sail of these boats is of matting, as usual, the tack brought to the weather-bow, and the luff set taut by a spar from the deck set in



MORNING: KOPA ESTUARY.

a cringle halfway up. The mast is strongly stayed on the weather side. I was astonished at their weatherly qualities, and, close hauled, they will make an exhibition of an average ship's boat. The hull is

SAMPANS.

similar to that of the Selungs of the Mergui Archipelago, the gunwale and topsides being of neatly lashed cane.

Nearly the whole of the rice of Takuapa is imported, there being only sufficient grown for the Siamese population. When we arrived, both rice and opium were running short, as the steamer due from Rangoon with large consignments of these necessaries had been lost off

the Moscoes in the recent heavy weather. The consternation among the Chinese Towkays, when we brought this news, was great, for the Chinese miner without his rice or opium is inclined to clamour. Messages were sent overland to Puket to represent the state of things, and meanwhile a series of gales set in which kept us prisoners.

The elephants I had ordered in for the march to Renong were unable to reach the town, owing to the swollen state of the streams, and at the end of a sufficiently dull week a few arrived, staggering like drunken men through the current of the river. While waiting for their brethren, they played havoc among the gardens, and we were besieged by irate husbandmen and their wives crying for compensation. I set Master Cheerful to tell them stories, and Master Star was turned on to warble his falsetto trills, which, though they used to make me only irritable, seemed to have a calming effect on them. We were thus able to send them away softened and appeased, with a tical or two as a price for our elephants' dinners. The elephants were brought in by their mahouts for punishment, and though they looked, on their arrival, highly satisfied with themselves, after being two hours tied up standing absolutely still, they became penitent enough.

FIG. 1.

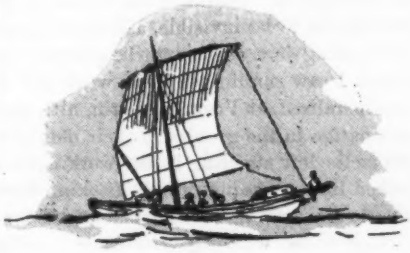


FIG. 2.

ORANG LAUT BOAT (FIG. 1) FROM LEE SIDE, (FIG. 2) AND WEATHER SIDE.

There was one dry space in the vicinity of the town on the small pagoda hill overlooking the turbid yellow river. Here the boys of the place played a game exactly akin to our "hide and seek" all the time it didn't rain—the first time I have seen the Siamese youth so exert himself. In the evenings we had concerts, which were well attended by our neighbours, our orchestra consisting of two accordions, a piccolo, a tin pot and two sticks, and we gave an enthusiastic betel-chewing audience selections from the Siamese Ma Yong, Soi Son, and Plaeng Lo, and some English songs like "Nancy Lee;" the chief advantage of the Siamese airs being that they can go on without ever stopping, thus providing that monotony dear to the Eastern heart. Our only

interruptions were the occasional removal of part of our roof by the gale, and the inrush of the waters. The weather moderating and a steamer calling in, we were able to accomplish the journey to Renong in ten hours instead of ten days, which we should have taken going overland.

The alluvial tin of this province has been almost entirely worked out, and the mining is now all going on in the hills, up the lovely granite gorge through which the Hat Sompen stream has cut its way, and is centred round the village of that name about $7\frac{1}{2}$ miles from Renong. The valley is here wide and open, the stream a wide sandy track of tailings, and the hillsides are gashed and dyked just as in Tongka. These hill-miners are miners in the true sense of the term—unlike the coolies, who dig and carry the alluvial as if they were making a railway embankment. Here the miner is a skilled hand at hollowing a tree-trunk, or slicing off the bark for his water-launders; in selecting, cutting, and splicing the hard woods for his aqueduct, or cutting his mile-long trenches along the contour of the hills—which are alone, many of them, quite feats of engineering. He knows wolfram and hornblende, which he calls "dead tin," and he follows with unerring scent the tin which "un do knaw sure noff."

The granite is peculiarly white, soft, and decomposed, and the tin runs all through it. Unlike what I saw in Puket, it is often in such fine particles as to be invisible, and some places looking quite poor proved, on washing in a dugong, to be rich in tin. Some large hard veins of quartz I saw running east and west, and dipping about 60° south, were unmineralized, and carried no tin, although there was often a rich dissemination in the granite in their neighbourhood. Some of the granite pinnacles left standing in the workings some 200 feet above the stream looked like grotesque ruins. Looking down from them upon the valley where the driving rain-mists blurred the outlines, one saw the sloping cottage roofs, winding watercourses, piles of tailings, timber, sluices, and water-gates, with a few men moving industriously about, stirring with the chonkuls in the boxes, strengthening weak banks, plying their crowbars on the rock faces, and generally helping the thundering streams, and making the most of the rain-time, which, if bad for fevers and the like, is yet, say they, "good for tin." On all, the red and yellow stains contrast with the heavy green of the surrounding forest, climbing far into the clouds upon the western hills.

The mines are worked on a licence system introduced by the late Rajah, the average size of a grant being 10 olong (1 olong = $1\frac{1}{3}$ acre). The licence lasts a year; trespassers on a particular "kongsie" (whose name is always written up on the coolie houses, or somewhere on the "sett") are subject to fines, and all complaints go before the Rajah. Water sources and rights are defined on the grants, and order is consequently preserved. The smelting is done in Renong principally by the Rajah. The charcoal is all made in the surrounding country,

licences being granted for felling the necessary timber. The furnaces are of the usual clay pattern, and smelt 280 bags of 20 to 22 catties each in three days and four nights; six men working change at the bellows, with two overmen, who superintend the charging, tapping, etc. The slag is usually recharged four times, and then stamped fine in a small battery of four heads and treated once more. Renong is famed for its roads and the hospitality of the Rajah, who is the brother of Phya Rasadah, and not behind him in clear-sightedness.

On our way up the Pakchan I had subsequently an opportunity of seeing with Messrs. Kenny and Clunis, who were at the British station at Victoria Point, some of the remarkable lodes of the Maliwun district on the west. The tin occurs in light grey crystals often 1½ inch long, in well-defined and highly mineralized east and west lodes, and is quite different to anything I had seen on the coast. It struck me as a grand country, but the population is astonishingly small, and it seems a century behind the Siamese side. From here to the Lenya river and to Tenasserim extend nothing but dense forests full of elephant, rhino, pig, buffalo, tiger, and deer, but hardly a trace of man. We found the people all along the Pakchan river suffering from an epidemic of dysentery, which the continuous chilly rains no doubt aided, and which they seemed to have no ideas of combating. The old Muang Kra is now more generally known as Pakchan (Pæchan, "the forest of sandal-wood," and *not* Pakchan, "the mouth of the trap," as has been suggested), and the valley is a pretty little paddy-growing plain—in decent weather.

V. Up the East Coast.

We all showed signs of sickness when we left Kra for Chumpon with ten elephants, four of them accompanied by their babies. It is an easy march, and has often been described and visited by persons interested in the canal scheme. There is tin lying in the main range away to the northward, but it has been but little worked. We slept at Tarsarn, and next night at the governor's house at Chumpon, and it was curious to find ourselves under an almost cloudless sky, with a dry air about us, and a baking soil beneath, and the change from the damp of the west coast to the warmer temperature soon set us up again. It was still blowing hard, but the climate was a different one, while not 20 miles away to the westward we saw the heavy clouds lying low upon the watershed. This phenomenon is seen all down the peninsula, and the rains may be on with all their force on the west while the east is still athirst.

The training of the elephants struck us as being here more superficial than in most parts of Siam, and we witnessed some wonderful differences of opinion between elephants and their masters. One of ours made off in the night; he was followed up next morning by two men, and when

we were on the march later in the day we met him being brought in by them. One sat in the usual place upon the neck, the other just behind; and as he rushed and plunged wildly about, they clung to him with knees and toes, belabouring him with their sharp-pointed spikes till he was covered with blood. He was a huge beast, but he had to give in, and the men seemed glued to him. The babies, as usual, were most amusing, and led my dog Rover a terrible life. Whenever he was helpless, swimming to cross some deep pool, they would rush upon him, and how he escaped being killed was a mystery to himself as well as us. Along the trail any elephant he approached would kick out sharply, swing the bristles of his tail on to his head, or make a shot at him with the end of his trunk. On the whole, Rover, who is particularly fond of stalking, and playing the tiger with a herd of buffaloes, found elephants less amusing.

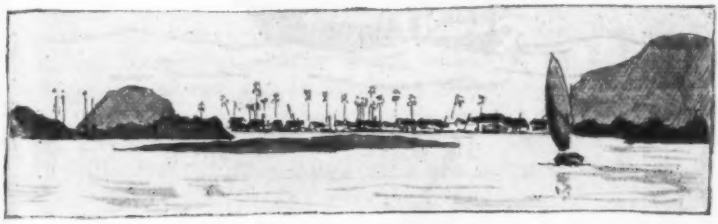
The Chumpon plain is typical of Siam, with the gaunt sugar-palms along the streams, the large herds of cattle and tracts of paddy-land. The people, too, have much less accent, and in their houses, boats, and appearance conform to regular Siamese custom. We took up our quarters in the large Chinese and Siamese fishing village at the mouth of the river, expecting daily that a steamer would be in to call for us. A number of fine junks were lying in the roads outside the bar. There is no greater mistake than to talk of these craft as "crazy little vessels of cumbrous, antiquated shape, mat sails, and decayed rigging." On the contrary, the moment they are in port the running rigging is all unrove and stowed away, the sails are carefully covered up. When hoisted, they generally show a shape and flatness of set, which makes them the patterns for ship-boats' sails all over the East. Their varnished hulls and smart little touches of paint vie with those of the famed Thames barges. As it was the height of the "pla too" fishing season, the bay was alive with craft.

The village is entirely devoted to fishing. All along the river are high bamboo stages for fish-curing, net-drying, and fish-trap plaiting, these operations being carried on principally by the women while their husbands are afloat or taking a watch below. The place smells strong, but what matter when you are living on fresh fried pla too, calamary, oysters, eggs, bananas, pineapples, and mangosteens? In every way the contrast to the other coast was delightful; for there is no doubt that one can have quite enough of uninhabited country, and that in reality no scenery can be complete without some trace of the child of man upon its face.

The coast trade is somewhat extensive. Large quantities of fish are salted and sent to Bangkok, Kalantan, and Singapore. At Bangkok they pay import duty of one salung (¼ tical) per picul, and prices vary from three salung to five ticals a picul, according to the time of year. June and July are the months in which, finding smoother water, the fish, like

the vessels navigating the gulf, approach the western shores to windward. In the north-east monsoon, on the contrary, the fish harvest and the navigation all goes on on the north and eastern coasts under the lee of the land. Edible birds' nests from the steep islands of the coast are also a considerable article of export to Bangkok; the islands are farmed by the Governor of Chaya. Rattans and jungle produce, horns and skins, all add to the local trade.

After a few days' waiting and finding no steam craft turn up, I arranged with a young Siamese, who owned a "rua pet," to take us to Bangkok. He was bound to Pechaburi with rattans; and his crew consisted of a crumpled, weather-worn old Lukchin * as sailing master, two quiet Siamese as ordinary seamen, and a young brother known as Dek, or the boy. With our party of eleven there was not much room left. The boat was 36 feet long with 11 feet beam and 6 feet

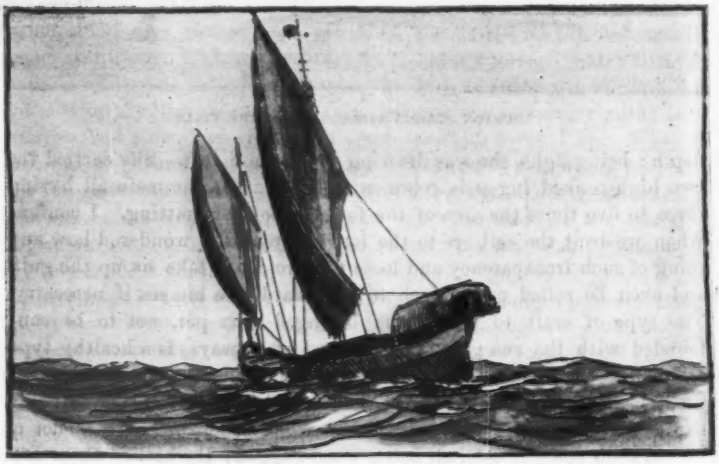


CHUMPON FISHING VILLAGE, FROM THE RIVER.

depth; being light, she was drawing not quite 3 feet. She carried the two high-peaked lug-sails common to these craft, the mainsail having three to five times the area of the foresail, both of matting. I confess, when we bent the sail on to the long mainyard, I wondered how any thing of such transparency and loose texture could take us up the gulf, and even be relied on to reach to windward in a big sea if necessary. The type of craft to which she belonged (rua pet, not to be confounded with the rua pets of the inland waterways) is a healthy type common to the Siamese of the coast. They are double-ended, and with great beam carried well aft; the floor is rockered up fore and aft, and flat enough to ensure their sitting up when ashore. There is not a nail in their construction, all being wood-pegged; the best of them are invariably built of "mai takien" in preference to teak, and will last thirty years' knocking about without substantial repair. Such a boat, 50 feet long, 15 feet beam, and 7 feet deep, will cost new about $900. There is no keel, and the rudder is shipped on a spindle aft on the round stern. The masts have a great rake aft, and the yard is peaked by a separate peak halyard, and a downhaul at the fore end. They would be

* Lukchin, name applied to sons of Chinamen by Siamese mothers. They generally have the good qualities of both races.

much handier for a tackle on main halyard and sheet, and at present the chief difficulty in handling one is the want of such contrivances. To hoist the yard up, four men have to swing their whole weight on; and the only way of getting the sheet in is to luff and take the strain quite off. Reefing is done by rolling the sail up round and round the boom as the yard is lowered, and in furling the whole sail is rolled up in this



LOCAL TRADERS IN THE GULF.

manner to the yard until it looks like a lateen. The yard is controlled by a brace to the stern-post, which is usually kept pretty taut even when free. It is true this furl gets the sail out of the way, but the weight aloft makes them roll at anchor, and a strong squall getting them on the beam has been known to capsize them when light. The foresail is seldom trimmed much, or reefed; it is more a steering sail.

The boats bear a very heavy weather-helm, and have to be trimmed very much by the stern. Rayong and Chantabun on the East are the great birth-places of these boats.

The sea-going Chinese and Lukchins of the gulf usually prefer a type of longer, narrower, and much shallower craft known as rua chalom, which are easily distinguishable by their high peaked stern and stern-post. The larger trading craft carry the two lug-sail rig already referred to, though sometimes they use the battened China lugs. The small fishing craft, on the other hand, adopt one big standing lug, cut square-headed like a coble's, and set on a mast stepped amidships, and raked well aft. Their main peculiarity is the two rudders shipped one on each quarter; the helmsman uses the one on the lee side, though before the wind he often uses both. When down they draw several feet more than the boat, and when up one may often be seen set up on end to act as a mizen and keep the boat's head to sea. As far as my experience goes, this type, having less hold in the water than the rua pet, and being even rounder in the bottom, is, size for size, less efficient to windward, and a one-rater of my own which has no chance with them off the wind, has, beating to windward in a moderate sea, put them 4 to 5 miles under her lee in a few hours. In most of them there is a plaited "kadjang," or shelter amidships, and some of the big rua chaloms have a quaint little steering-house up aft.

It is curious to note the small local peculiarities of the different sea-side places in their boats and fittings, so well adapted to their own localities. Their smartness in handling, and their appreciation of the qualities of their craft, make the seafaring class of the gulf one of which any coast might be proud. In their language, their ways, and the nameless something there is always about seamen, they are very distinct from the shore-going Siamese. They are hardy, eat little and simply, and face all weathers in a pair of short loose white or blue trousers coming halfway down the thigh; they are as much at home in the water as out, and their hard skins seem impervious, and glisten like an oilskin coat. I have seen a man spring overboard in a heavy sea on a lee shore to pick up the tiller, which got unshipped and washed away, and then swim away with it dead to windward, fetching the boat as she came by on the other tack—a feat which called for nerve and judgment of no ordinary kind.

Their names for the winds do not go, I may here remark, according to the points of the compass, except in the case of due east or west winds, which are comparatively rare.

Eng. Point.	Siam. Point.	Wind.
N.	Nua.	Lom Wow.
N.E.	Nua Tawan ok	,, Ut Kra.
E.	Tawan ok (sunrise).	,, Tawan ok.
S.E.	Tai Tawan ok.	,, Hua Kao.

Eng. Point.	Siam. Point.	Wind.
S.	Tai.	Lom Tapow.
S.W.	Tai Fawan tok.	„ Salartan.
W.	Tawan tok (sunset).	„ Tawantok.
N.W.	Nua Tawan tok.	„ Yego.

A squall is known as Lom Fon, or the rain-wind.

We hove up at evening on June 12, to get the night flood up the coast, and by morning were off the limestone bluff of Lem Chong Pra, the wind freshening merrily on our quarter. We passed during the day a number of rua pets beating down the coast, like ourselves with mainsail reefed, making lovely pictures as they plunged through the head sea. At sunset Kao Luang lay abeam, lost in clouds and rain, and we had another reef down. Wind S.W. 5. A number of large open grass spaces visible to-day along the hills.

The morning came calm, and we rolled about off Muang Kuwi, to the discomfiture of the cooking operations. The Siamese say eating something nice brings wind. It is questionable how far half-done curry and quarter-boiled tea is nice; but the wind certainly came up in the middle of breakfast and lay us down to a pretty angle, and sent us roaring up past the shoal-water patch and the fishing-stakes below Sam roiyat. We passed lovely little villages clustered in sandy bays, and lots of rua pla (small four-oared rua chaloms) out fishing at their stakes, or going up deeply laden to their villages. The time was enlivened by the yarns of Dek, who talked and chaffed incessantly when his elder brother and the Luk Chin were having a caulk after their watch. He was a lusty specimen of the well-to-do Siamese; he wore a clean, tidy panung and white jacket, which he did not disdain to disregard when a reef had to be taken down or the yard set up; he was one of those people to whom everything healthy comes as enjoyment, and his conversation was less coarse than is often the case with the more idle of his class. His elder brother was one of nature's gentlemen—a quiet, refined, and thoughtful-looking fellow, with the manners of a courtier and the heart of a sailor.

Passing Muang Pran, with a breaking sea running astern, we were off Chulai Peak before sunset; and from here our sailing master hauled off the shore, and headed away for the bar of the Meinam river. He brought up his prayer-papers with great solemnity, and, selecting a couple, lit them on the lee gunwale and hove them overboard, and a joss-stick was put burning on the stem-head. The only apparent result of this was the collection of a heavy bank of clouds in the north-west, which covered the sky very fast, and, as the sun set, rushed over the moon. We reefed down in the darkness and got supper stowed, and soon after the south-west wind was dead, and the water darkened in the north-west. The clouds aloft suddenly ceased tearing across the sky, and then the lower current of wind came sweeping down. All night we flung close hauled through a short, rough sea, the men

crouched to windward, and the spray flying far alee. Next morning we were 5 miles off the Tachin river in a roaring calm, with sixteen men and one dog bursting their lungs with whistling. I had a bathe, to the great horror of the Siamese, who all exclaimed, "Why, it's salt!" I told them how in Europe people travel hundreds of miles (by train, not on elephants) to bathe in this same salt water, and they classed this with the yarns of the sailing master, which were prodigious.

The western hills lay far astern, and on the eastern horizon, beneath the round red sun, lay the Bangplasoi mountain. To the northward, suspended in the heavens, lay groups of trees and boats' sails, and far beyond the smoke of the rice-mills of Bangkok. By three o'clock, with a roaring flood and a smart south-west breeze, we were in Paknam, and that night we bade farewell to our shipmates. There is nothing like the sea for bringing men together, and making good-byes loth.

Our return to Bangkok was the signal for every one of the men who went with me to get laid up with fever; they did it with a promptitude and unanimity which exceeded what they had ever before shown. However, one or two were really very ill, and have now been so for months. Bangkok seems to have a way of its own in this respect, and successfully invalids hundreds of men who have gone through long jungle marches without any sickness. What the cause is it would be hard to say, especially as it generally happens within a day or two of the return.

Before the reading of the paper, the PRESIDENT said: The meeting will remember that a year ago we had a very interesting and very able paper from Mr. Warington Smyth, describing his journey to the sapphire mines on the northern frontier of Siam, and his return by the Mekong valley. The paper was considered so important that the Council resolved it should be published separately as a volume, and with capital drawings to illustrate it. The volume is now ready, and I would urge upon Fellows, as many as possible, to send for it, for I am sure they will be well repaid. It is a most interesting little volume; moreover, the experiment of publishing has not yet been settled, and it will rather depend on the success of this first undertaking whether the Council of the Society will be able to make it the first volume of a series, or only an exceptional publication.

We are assembled this evening to hear a second paper from the same author, Mr. Warington Smyth, which I think you will find equally interesting. It is a journey from Bangkok to Tenasserim and down the river; afterwards he visited the Mergui pearl fisheries and tin workings of the Kra Isthmus, and other points of great general and geographical interest. I regret very much that he is not present this evening, for he is still doing useful work at Bangkok; but I am glad to say his friend Mr. Probyn will again, as he did last year, have the kindness to read Mr. Warington Smyth's paper.

After the paper was read, the following discussion took place:—

The PRESIDENT: I regret very much that Mr. Curzon is unable to be present this evening. I have seen him this afternoon, and am happy to be able to tell you that our Vice-President has returned from his perilous and most interesting journey,

looking as well as he did when he started, and that he has promised to give us a paper that must certainly prove extremely interesting on the subject of the sources of the Oxus. Mr. Warington Smyth, in his paper, alluded to the forests, especially to the trees yielding the dammar oil, and referred to some of the forest rules, such as that which disables people from building their canoes because of the tax on the felling of timber. I see present to-night Sir Dietrich Brandis, to whom England owes so much as the organizer of our Indian Forest Department. I am very glad to see my old friend again, and cannot refrain from expressing a hope that he will address us on the subject of the forests of Tenasserim, more especially as there are few people in the world who are so intimately acquainted with that country as he is.

Sir DIETRICH BRANDIS: I am extremely obliged for the kind invitation to speak about the forests of this country. I should like to do so, but it would take longer than the patience of the ladies and gentlemen assembled here could possibly permit. The paper we have had the pleasure of listening to to-night, with its excellent illustrations, has carried me back to the time, many years ago, when I had the great privilege and pleasure, for which I can never be grateful enough, of serving my first seven years in Burma under a man whose name is far too little known in Great Britain, an Irishman, a good man and a great man, Sir Arthur Phayre. I mention the name because, in this paper, we heard that Mr. Smyth, when he approached British territory going from Siam, at first met with things that did not please him—a wild feverish country, the Tenasserim river not used commercially, for trade or communication, only one boat, one canoe, while he met with complaints from the Karens. He found them complaining that they were not allowed to cut the large trees growing about, in order to make canoes. I do not know what forest rules have been introduced since my time; there may have been some ill-advised arrangement—that is quite possible. It is also possible that the country along the Tenasserim river was not inhabited, and that the Karens in reality did not care to make any boats, as it is very feverish about there. I was pleased that when he came into the vicinity of Tavoy, he spoke with satisfaction of the roads and rest-houses which, under British Government, have sprung up; for too little appreciation is shown of that part of British India, formerly the kingdom of Burma. I had the privilege of commencing my service in Pegu early in 1856, only three years after its annexation, and I saw how, through the wisdom and the determination of Sir Arthur Phayre, that country was converted from one of the most unruly and wild into a flourishing and well-peopled country. In 1860 I was on the banks of the River Sitang, and opposite was a large crowd of people I did not expect to see. I went across in a boat, and found myself in the midst of ten thousand Shans; they had crossed the frontier. I made the acquaintance of the Sabwa, and we became great friends. I was able to help him, as he had no money left; in fact, I was able to buy a pony from him. They had fled from their homes, fields, and possessions, because they could not stand the oppression of the Burmese governors. A few years afterwards I saw them again; they had built a large city on the Sitang river. That is how Sir Arthur Phayre managed to populate the country. The population of Pegu rose from 700,000 in 1856 to 2,300,000 in 1881. I was glad to see the results of British rule in the southern part of Burma, and it has pleased me much to see that Mr. Smyth speaks with some satisfaction of the Karens. Now, that is another point on which far too little is known; it is hardly known that the Karens are probably the most loyal subjects Her Majesty possesses in the British Empire, outside England and Scotland. That is a matter of importance, and among the Karens Christianity has made great progress. You may say half the nation are Christians now, and it was a pleasure on my first

journey, after spending several days in the wilds, meeting hardly anybody, in the evening to hear at a distance the sound of the song of praise which they sing in their chapel; and it was a pleasure to see the schools, in which the Karen boys were squatting down in large numbers, men, even a few with white hair among them, trying to learn as fast as the boys. Later a bold attempt was made among the Karens, not only to teach the boys, but to teach the girls, which was much more difficult. I was present when a very enthusiastic missionary lady had an assembly of the headmen (Tsokays) to meet her, and said to them, "You teach your boys nearly as well as the Burmese boys are taught in their monasteries." (This was about 1856, and at that time it was rare to find a Burman who could not read or write; and if I did find such a man he was miserable, and said, "It was my misfortune to grow up in a jungle village; we did have a pongee, but the water was bad and the air was bad, so he left; we could not keep him.") "Now you must educate your girls, or the boys will never look at them; they will go somewhere else to marry." These Tsokays, who were great friends of mine, were very shrewd, and answered, shaking their heads, "Mama," as they called the lady, "it won't do. These girls of ours are far too clever already, and if we make schools for them, if we teach them in addition to their cleverness, we shall be nowhere; they will be Tsokays." I mention this, because I was glad to note that Mr. Smyth looks with approval on the way women are treated in Siam. When I travelled in Burma I had many friends among the peasants, proprietors of their own lands, and they would tell me of a bullock or a cart, "My wife bought that." A peasant would never dream of buying a bullock without his wife's approval, and that is how the ladies are regarded over the whole country. That is the wonderful difference between India, where I lived for many years afterwards, and the Burmans and Karens. I knew these people well, and when I came with my wife to a village and took up my quarters with the headman, the woman of the house would do the honours, make us comfortable, and take great pride in showing her the kitchen and all other household arrangements. I must ask your pardon for having spoken so long, but your president bears the responsibility of asking an old man to tell of his bygone days.

Mr. J. Annan Bryce: I don't know that I have much to say, especially after the excellent illustrations which Sir D. Brandis has given with regard to the manners and customs of the people of whom I had experience further north. I may answer the question you asked him about the duties put by the government upon the export of various timbers. A great many people have felt aggrieved of late years at the action of the government in that particular respect, and they have urged upon the government, without success, the desirability of leaving these useful woods free of the heavy duties imposed upon them, which are tending very much to strangle the export, and encourage their use not only in the country itself, but for many purposes to which they might be applied in England. I know it would be possible to bring one of the most hard and lasting woods in the world for use in England to pave our streets, if it were not for the enormous export duty put upon it. It may interest you to hear something about the different races about which Mr. Smyth spoke. These Mons of whom he has spoken are a race extending right across the peninsula from Anam to Pegu, and the other races occupying the country, of which he speaks, came down and settled themselves in the middle of this Mon race, so as to split them into two branches, in Anam and Pegu. The Krans are probably previous inhabitants; and the Shans, as they have come to the coast, have been called Siamese, who, like the Burmans, irrupted subsequently from the north, and conquered the previous inhabitants of the country. But under the rule of the Siamese and British, these races get on very well together.

Mr. Warington Smyth spoke of the amusement sometimes caused by the action of elephants when starting on journeys or while travelling. Like myself, he could tell many stories about them. I have seen sometimes a caravan delayed for a whole day in trying to catch an elephant, which, having found a nice deep pool in the river, prepared to disport himself there rather than march on the road under a hot sun. The mahout would go down the stream and get on his back, but the moment he began to use his goad the elephant would sink under the water, and of course the mahout had to come off. Another amusing story, which would be a pleasant illustration of the same kind of thing, happened in the timber yards of Rangoon, where we had a powerful and magnificent elephant, the very best I have ever seen, doing the work. Like the Kran ladies, he had considerable native ability, and was able at once to find the centre of gravity of a large piece of timber. He would walk up straight to a very heavy slab, which was naturally much thicker at one end than the other, and put his tusks under the exact part necessary to lift it without any fumbling. These elephants sometimes get into a state of wildness (must), and it is known when this is coming on by an exudation from the forehead, which ceases when that state passes off. This elephant had a peculiarity, in that the exudation used to stop long before he was in a safe state. One day when he was being taken out to work in the mills, he suddenly developed a homicidal tendency. The mahout was too quick for him, and got into a pond where the water for the engines was stored. The elephant then commenced to pelt him with pieces of timber, but he succeeded in scrambling out on the other side. There were fourteen or fifteen other elephants in the mill; these he drove out. Unfortunately, at this moment Lord Ripon, who had come down from Burma, was anxious to see the working of the timber mill, which had been literally swept and garnished by the elephant. Day after day the elephant went out into the paddy-fields, like the one of which Mr. Warington Smyth speaks, did a great deal of destruction, and several people, I am sorry to say, were killed. We got a notice that this elephant must be caught and killed, and accordingly issued notices all round the country for the elephant-catchers to come and help us. They suggested, very naturally, that one of the best modes would be to dig a pit in the mill compound, as he might be induced to fall into it. Accordingly, it was dug, covered over so as to look like the rest of the ground, and one night, sure enough, the elephant came into the compound. But, unfortunately, they had not provided against the possibility of his getting out again. One peculiarity of elephants in general is the carrying about of a piece of timber, with which they scratch their backs, and with the help of this he somehow swarmed out of the pit. Well, then the old trouble began to repeat itself. He destroyed the paddy-fields and killed some more people. However, we finally circumvented him. A Madras coolie in the building suggested we might again dig a pit, fill it with mud, and cover it as before, tempting the elephant to go in by putting a dummy on the top and working its arms and legs. This was necessary, because the elephant, after falling into the first pit, never used to come into the mill without tapping the ground in front of him with this piece of log. We therefore rigged up the scarecrow, and watched for an occasion when the elephant came in, that we might tempt him. One day he was driven in by the hunters, and, when enraged by their shouts, saw the figure waving its arms and legs. He accordingly charged it, and tumbled into the pit. This time he was unable to get out, but lay there until he was exhausted with hunger. He was then pulled out with chains, and never said a word afterwards.

The PRESIDENT: We must thank Sir Dietrich Brandis for his interesting address, and also Mr. Bryce for his entertaining anecdotes. Mr. Warington Smyth's paper was curtailed for reading. It contains a great deal of very interesting and

valuable geographical information, especially respecting the ancient and modern races in this country, which will be printed in its entirety. To my mind Mr. Warington Smyth's style is admirably adapted for geographical description. It is lucid, clear, and most interesting, and, above all, every line seems to overflow with the interest he takes in whatever he sees, and his sympathy with all the people he meets. We must all regret he is not present, and I am sure you will instruct me to convey to him our very warmest thanks for his valuable and interesting paper. We must not adjourn without thanking Mr. Probyn, his friend, for having so kindly read the paper.

ON THE GENERAL CONFIGURATION OF THE EARTH'S SURFACE.

By Sir JOHN LUBBOCK, Bart., M.P., F.R.S.

In 1887 I sent to *Nature* a letter, of which the following is a copy:—

"*On the Southern Tendency of Peninsulas.*

"Sir,—The attention of those interested in physical geography has long been attracted to the remarkable fact that almost all the great peninsulas of the Earth trend southwards, and that the majority, at any rate, have an island or group of islands at their southern extremity.

"Thus Mrs. Somerville, calling attention to this, says: 'The tendency of the land to assume a peninsula form is very remarkable, and it is still more so that all the peninsulas trend to the south—circumstances that depend on some unknown cause which seems to have acted very extensively. The continents of South America, Africa, and Greenland are peninsulas on a gigantic scale all directed to the south; the peninsulas of India, the Indo-Chinese peninsula, those of Korea, Florida, and California in North America, as well as the European peninsulas of Norway and Sweden, Spain and Portugal, Italy and Greece, observe the same direction.

"'Many of the peninsulas have an island or group of islands at their extremity, as South America, which is terminated by the group of Tierra del Fuego; India has Ceylon; Malacca has Sumatra and Borneo; the southern extremity of Australia ends in Tasmania or Van Diemens Land; a chain of islands runs from the end of the peninsula of Alaska; Greenland has a group of islands at its extremity; and Sicily lies close to the southern termination of Italy.'

"Now, may we not correlate this with the remarkable preponderance of ocean in the southern hemisphere, which M. Adhémar has suggested to be due to the alteration of the centre of gravity of the Earth, caused by the great southern cupola of ice?

"However that may be, the preponderance of water in the south is very remarkable. Taking each parallel as unity, the proportion of sea is as follows:—

[The figures I gave were slightly different. I have substituted those resulting from more recent studies.]

60° North	...	...	...	0·392	10° South	...	...	...	0·795
50° „	...	...	...	0·438	20° „	...	...	...	0·763
40° „	...	...	...	0·538	30° „	...	...	...	0·797
30° „	...	...	...	0 567	40° „	...	...	...	0·961
20° „	...	...	...	0·674	50° „	...	...	...	0·983
10° „	...	...	...	0·758	60° „	...	...	...	1·000
0° „	...	...	...	0·783					

"Without, at the present moment, entering upon any discussion as to the cause which has produced this remarkable result, the fact, at any rate, seems to throw some light on the southern direction of promontories, for which, as far as I am aware, no cause has yet been suggested. For let us suppose three tracts of land, each trending north and south, each with a central backbone, but one with a general slope southwards, one with a northward slope, and the third without any. The first will, of course, form a peninsula pointing southwards, because, as we proceed southwards, less and less of the surface will project above the water, until nothing but the central ridge remains. The second tract, however, would also assume the same form, because, though by the hypothesis the land does not sink, still the gradual preponderance of water would produce the same effect.

"If, however, the central mountain ridge, as is so generally the case, presents a series of detached summits, the last of such elevations which rises above the water-level will necessarily form an island, situated, with reference to the land, like those mentioned by Mrs. Somerville.

"Lastly, in the third case, the gradual diminution of water would tend to neutralize the effect of the slope, and if the two were equal, the land would form, not a pointed peninsula, but an oblong tract.

"If there is anything in the above suggestions, it will throw some light on the southern trend of peninsulas by bringing them under the general law to which is due the remarkable preponderance of ocean in the southern hemisphere.

"JOHN LUBBOCK."

Mr. Francis Galton, however, pointed out to me a difficulty in this suggestion, viz. that no additional depth of water in the northern hemisphere would have any similar result. I tried several hypothetical cases, and the statement is no doubt correct. The difficulty has puzzled me much, and I now venture to lay the following consideration before the readers of the *Geographical Journal*. I have elsewhere pointed out * that if the elevation of folded mountain chains be due to the gradual contraction of the Earth, then—though, so far as I am aware, no attention

* 'Beauties of Nature,' p. 295.

has yet been called to it—the compression and consequent folding of the strata would not be in one direction only, but also in a second at right angles to it, though the amount of folding might be greater in one direction than in the other.

This, I think, accounts for many points in the configuration of mountain districts, and for the many cases in which rivers bend at right angles. If, however, folded mountains are due, as thus suggested, to a diminution of the diameter of the Earth, every great circle must have participated equally in the contraction. The east and west folds would, on the whole, counterbalance those from north to south. This must be so theoretically, but we have no means of testing it by figures. It is interesting, however, to observe that, while the mountain chains of the Old World run approximately from east to west, those of America are, in the main, north and south. Speaking roughly, the one series would seem to balance the other, and we thus get a clue to the remarkable contrast presented by the two hemispheres. Again, in the northern hemisphere we have chains of mountains running east and west—the Pyrenees, Alps, Carpathians, Himalayas, etc.—while in the southern hemisphere the great chains run north to south—the Andes, the African ridge, and the grand boss which forms Australia and Tasmania.

This, then, seems to me the answer to the difficulty suggested by Mr. Galton.

The explanation of great mountain ridges by lateral pressure and consequent folding, coupled with the necessity of approximately equivalent contraction along every great circle, explains the balance of east to west and north to south chains in each hemisphere; and this again, in conjunction with the preponderance of water in the south, explains the tendency of land-masses to taper southwards, and end with an island or group of islands, thus throwing an interesting light on some of the principal features in the configuration of the Earth's surface.

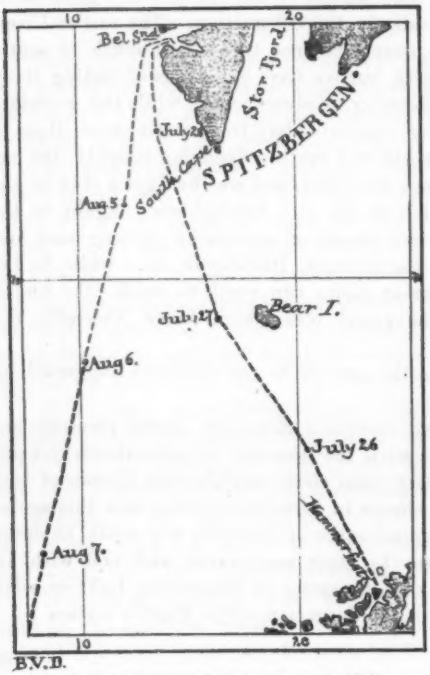
VISIT OF THE TRAINING SQUADRON TO SPITZBERGEN IN THE SUMMER OF 1895.

The following account of the visit of the Training Squadron, under the command of Commodore Atkinson, to Spitzbergen in the summer of 1895, has been drawn up by Commander C. H. Coke, R.N., and Lieut. J. P. Rolleston, R.N., of H.M.S. *Active*. The stay in Bel sound was very interesting, and the officers occupied themselves in observing and photographing, in making a survey of Recherche bay, and in examining the glaciers. This communication is a very welcome one, and the

excellent photographs by Lieut. Drummond and Mr. J. E. Corbett will form a valuable addition to the Society's collection. It is to be hoped that this will not be the last cruise of the Training Squadron which, while instructive for officers and men, will also be of interest to geographers.

Narrative.

July 25.—Having heard from three sealing schooners that there was no ice about Bear island, to the south of Spitzbergen, the Training Squadron, under command of Commodore George L. Atkinson, consisting of H.M. ships *Active*, *Volage*, *Ruby*, and *Calypso*, left Hammerfest, the most northern town in Norway, under steam at 10 a.m., and, passing along the east and north shores of Soro island, stopped for two hours to fish for cod, of which about ninety were caught; then proceeded for Spitzbergen.



TRACK OF THE TRAINING SQUADRON, 1895.

Nothing of note occurred on the voyage up, light winds and fine weather being experienced the whole way; there was very little fog, and no ice was seen at sea.

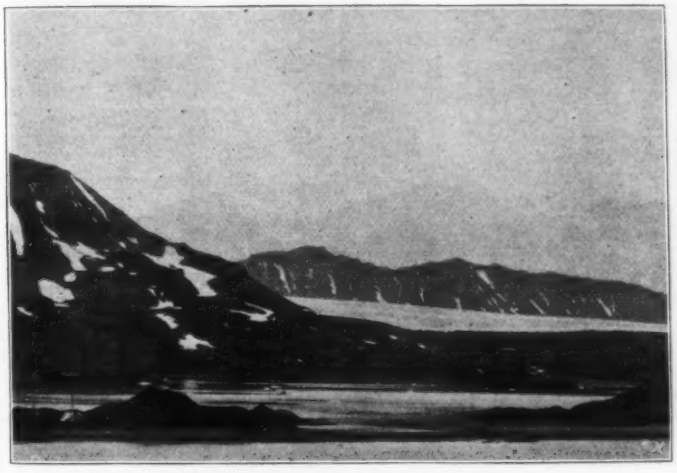
July 27.—The squadron passed about 16 miles south-westward of Bear island, which is 110 miles southward of Spitzbergen, in soundings of a little more than 100 fathoms. The weather being beautifully clear, a good sight of this barren-looking island was obtained, Mount Misery, at the south end, being a very conspicuous snow-capped mountain.

In expectation of cold weather, crow's nests were constructed at the fore topmast-heads of the ships for the look-out men, and blanket suits supplied for those on watch; but, as the temperature rarely fell below 40° Fahr., these precautions were hardly necessary.

Between the two islands numerous whales and small guillemots were seen; a small whaling schooner was also observed.

Sunday, July 28.—The squadron passed along the west coast of Spitzbergen, at about 25 miles. South cape was not seen owing to the mist. The general appearance of the land is very remarkable. Innumerable sharp peaks stand up, all about the same height, from the vast expanse of ice and snow; nearly all the valleys are filled with glaciers running down to the sea. The effect is not as white as one would expect, many of the hills being too steep for snow to lie on them. The air is so clear that the land looks much nearer than it really is.

Bel sound makes like a deep opening between high land, but, on nearer approach, the north and south entrance points are seen to run out low for some distance from the bottoms of the hills; the north point in



SOUTH-WEST PART OF RECHERCHE BAY.

particular stretches out a long way, and is said to be dangerous to approach.

July 29.—The squadron entered Bel sound and anchored in the south-west part of Recherche bay, in 18 to 20 fathoms, in the early morning.

The scenery is very fine, but terribly bleak-looking and drear. The mountains run in ridges down to the sea, serrated and sharp in outline against the sky. Tremendous glaciers almost fill the valleys—the work of countless ages—which gradually work their way to the sea, forming icebergs. The higher hills are covered with perpetual snow.

A strange silence prevails throughout, now and again broken by sounds resembling the roll of thunder or the discharge of heavy artillery, due to the cracking of these huge masses of ice. Nature

seems torpid; no vegetation anywhere to be seen, except here and there, on the sides of the hills, patches of moss, and a few stunted Iceland poppies. Seals abound, and in the morning one or two may generally be seen resting on the small icebergs which are scattered about the bay. Although the seine was hauled, no fish of any description were caught. Brent geese, eider duck, gulls, terns, and petrels are plentiful. Many nests and eggs of duck and tern were found on the island in the south-west corner of the bay, named by our surveyors "Training Squadron islet."

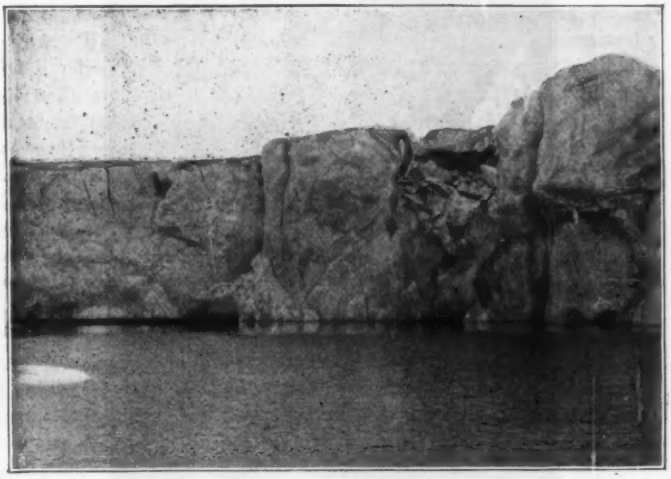
Recherche bay, so named after the French corvette *La Recherche*, which went there in 1838, in lat. 77° 30′ N., long. 14° 36′ W., affords

PART OF THE FACE OF EAST GLACIER.

capital anchorage in about 20 fathoms. Advantage was taken of the stay of the squadron to make a thorough survey of the place, a portion being allotted to each ship. The work was thoroughly done, twelve officers and about forty men being employed, the navigating officer of each ship being responsible for his portion, the whole under the superintendence of the navigating officer of the *Active*. The old French plan was found to be very correct. This magnificent bay is about 3½ miles long by 2½ miles wide, and practically clear of danger except near Reindeer point, from which foul ground extends for about half a mile. The mountains on either side are about 2000 feet high. At the head of the bay stands Observatory mountain, 1898 feet high, on which the officers of *La Recherche* established their observatory in the summer of 1838. No traces of it remain, but in an old cairn on the mountain-side one of the *Active's*

seamen found a sealed bottle, containing the names of "Ch. Martins, Docteur en Médecine, 3, Rue Hauteville, and Monr. Auguste Bravae (Bravail), Officier de Marine, 26, Juillet, 1838, *Recherche*," and ten others, dated "le 2 Août." The bottle was replaced, several cards of officers of the *Active* being added.

Two large glaciers run down into the bay, forming parts of two of its sides. East glacier, so named by the French surveyors, apparently takes its rise from the interior ice-cap, and is probably about 30 miles long. At its face it is about 1½ mile wide, 100 feet high out of water, and 20 fathoms under water. It evidently has been at some time nearly



PART OF THE FACE OF EAST GLACIER.

a mile further out in the bay than it is now, the point on its west side being composed of old ice and *débris*, of which there is also a great deal along the shore on its east side. Fox glacier is nearly as big at its face, but it takes its rise in the hills on the west side of the bay, so that it is comparatively short. There is another large glacier about a mile eastward of Recherche bay. Large pieces of ice constantly break off the faces of the glaciers and float about the bay, and though none were seen large enough to incommode a vessel at anchor in the south-west part of the bay, it is not prudent to go close to the faces of the glaciers in boats or small vessels.

Fortune favoured us during our stay with regard to the weather; only on one day did a gale of wind from the south-east prevent the survey being continued. The usual drills and exercises were carried out, and a cricket-match even was played on the south moraine of Fox glacier,

commencing at 9.30 p.m. and ending in the small hours of the morning, illumined by the midnight sun. The temperature of the sea during our stay was from 39° to 42° Fahr., and of the air from 39° to 47°. The climate is bracing and very pleasant when it is calm, but any wind off the land blows icy cold. English winter clothes are quite sufficient in summer here.

Human remains were found on the hillside southward of Fox glacier,

ICE CAVE IN EAST GLACIER.

which appeared to have been disturbed by some animal. They were carefully interred by parties from the *Ruby* and *Calypso*, and a cross erected to mark the spot.

A feature of much interest was a cave in the East glacier close to the water's edge, formed, it is supposed, by some sub-glacial stream in years gone by. It is from 6 to 8 feet broad, 20 feet high, and extends far into the glacier; and as the ice on the top was, for some distance, not too thick to prevent the light penetrating, the effect was most beautiful.

A stream flows from Fox glacier through Fossil beach, so called

from the numbers of fossil bones found thereon, many of which were brought away by officers of the squadron.

August 2.—The Norwegian schooner *Willem Barents* came into the bay. Mr. Martens Ekroll, the owner of the vessel, a Norwegian gentleman, came on board the *Active*, and from him the following information was obtained :—

He had come up on a hunting expedition, and had wintered in the schooner on the south-west coast of Edge island, having one station to the north and another to the south of him in Stor fiord. His crew had consisted of eleven all told. One had been lost in a snowstorm while following a bear, and was not seen again; another had died during the winter. They had received no news from the outside world for a whole year. He had so far secured sixty-three polar bear skins and about a hundred and fifty seal-skins, the former being worth to him from £5 to £6 apiece, and the latter, which are the hair seal used for leather, about 10*s*. each. It surprised us to hear that the polar bear is a cowardly creature, which invariably runs away when pursued. They had a cub in a cage on board whose mother they had killed.

They did not find the cold intense till after December. He and his company suffered, whenever the wind blew from south-east, from what he calls malarial neuralgia. It affected his eyes, giving him great pain and causing the right eye to become suffused with blood; others suffered from pains in the back and limbs. Quinine was useless; Fowler's solution was the best remedy. He found the thermometer on shore, although it was exposed, was about 3° higher than that in the ship.

The water round King Ludwig and Thousand islands was open all the winter. Stor fiord may be clear in the summer and yet inaccessible, because the ice occasionally stretches across its mouth, and in the summer Olga strait is clear; but the east coast of Edge island is inaccessible, and has been for some years. From observation he has found the warm current in Hinlopen strait, although the strait was not open; also in Helis sound and Freeman's strait. This, he considers, opens Olga strait.

From here we learned that the position of the eastern pack governs the condition of the ice and season on the west coast. In winter it never comes west of Spitzbergen south cape, slanting towards Bear Island. It breaks up in July or August, freeing the floes which drift round the south cape. Near Dun Islands the melting of these floes is forming a bank of shoal water, which is increasing. Bel Sound is nearly always open as far as Fox point. Recherche Bay freezes early, sometimes in September, and is not open till June or July. Magdalena Bay is more open in the early part of the summer than is Recherche bay.

The northern pack never comes south of Cloven Cliff. This is a bad year for ice in the north, as the northern pack is close down to the north coast of Spitzbergen.

August 4.—The squadron sailed on their homeward voyage, each ship firing a shell from a heavy gun at the Fox glacier as a last farewell to the ice-bound regions, arriving off Aalesund, in Norway, on the 10th, and so ended a most instructive and interesting voyage.

RECENT RUSSIAN GEOGRAPHICAL LITERATURE.

Russian geographical literature has lately been enriched by several very valuable works and publications. Foremost among them stands two new volumes of the Russian Addenda to Karl Ritter's 'Asia,' which had been interrupted for some time, but now, owing to the unabated energy of the Vice-President of the Society, P. P. Semenoff, and the excellent work done by I. D. Chersky during the last few years of his life, have begun to reappear. The first of these two volumes contains the description of "The Sayan Highlands, in the limits of the government of Irkutsk and in the south of the Siberian highway, to the south-west extremity of Lake Baikal;" while the second is "A General Review of the Baikal Mountains and Lake Baikal, its north-western coast, up to the mouth of the Upper Angara, and the Primorskiy and Onot ridges." If one takes into account the amount of exploration which has been made for the last thirty years in these two regions, as also the fact that most reports of these explorations published in the very little known 'Memoirs of the East Siberian Branch of the Geographical Society,' were for the most part destroyed by the Irkutsk conflagration, and therefore were almost entirely unknown even in Russia itself, one can fully realize the value of these two volumes, of over six hundred pages each. On this account only, they would be a unique source of information about an immense region, full of the most interesting physical, geological, and ethnographical features. Sufficient to say that the Sayans—that immense border-ridge of the great East Asian plateau, which contains in the Munku Sardyk group the only snow-clad peaks and glaciers of southern East Siberia, and was during the Tertiary age the seat of a great volcanic activity—as also Lake Baikal, such as we now know it after the explorations and soundings of Godlewski and Chersky, enter into the two volumes. But it must also be said that all the mass of recently accumulated materials was worked out, first, by so giftful a writer as Chersky was, and that his unfinished work was terminated and retouched by P. P. Semenoff, who has given to it the scientific finish and the thorough understanding of nature which characterized the very best, earliest productions of the same writer in his Addenda to Ritter's 'Asia' for the Tian Shan and the Amur region. The northern part of the government of Irkutsk, as well as Transbaikalia and the Gobi, will make the subject of three more volumes of the same series.

The yearly Report of the Russian Geographical Society for the year 1894 contains more than the usual wealth of information about work done in Russia, inasmuch as it embodies this year the reports of two branches of the Society, the East Siberian and the West Siberian Branch. In these last we find also summaries of all the articles contained during the year 1893 in the 'Memoirs' (*Zapiski*) and the 'Bulletins' (*Izvestia*) of the two always active branch societies.

The fourth volume of the *Annuary* (*Ezhegodnik*) of the Russian Geographical Society is also out, and contains excellent reviews of the work done by the General Staff surveyors in 1894; of the surveys made for the Ministry of State's Domains; of the progress of meteorology in Russia in 1892, by B. I. Sreznevsky; and of botanical geography, by I. I. Kuznetsov—this last being a very elaborate paper of eighty pages, in which the work done in West Europe in connection with the vegetation of the Tundras and the Steppes is discussed as well.

Of the several volumes of Memoirs (*Zapiski*) lately issued by the different sections of the Geographical Society, we must mention first of all ('Ethnography,' vol. xxiv.) the translation of the Chinese work, 'Men-gu-yu-mu-tsi' ('Memoirs on the Mongol Encampments'), by P. O. Popov, General Consul at Pekin. This remarkable production of two Chinese geographers, Chjan-mu and Khe-tsyu-tao, gives, on its first 157 pages, short topographical descriptions of the territories occupied by the different Mongolian *aimaks* (tribes) and confederations of *aimaks*, as well as short historical notices about each of them; while the remainder of the volume, *i.e.* over three hundred pages, is given to footnotes, which contain the greatest variety of miscellaneous information about the above territories and their inhabitants. Another volume of the same series, 'Smolenskiy Etnografichskiy Sbornik' ('Ethnography,' vol. xxiii.), is devoted to the folklore of Smolensk, and a third to the folklore of Macedonia.

As to the last issues of the Bulletins (*Izvestia*) of both the Russian Geographical Society and its East Siberian Branch at Irkutsk, they are, as usual, full of interest. The paper which is sure to be looked at first by the geographer is V. A. Obrucheff's paper on "Middle Nan-shan." The explorer gives in it the results of his journeys in the middle portion of the highlands, where he was enabled to verify his suggestions relative to the directions of the main mountain ranges, and the connections existing between the ranges crossing at the northern end of the system and those at its southern end. He gives now his final results in a sketch-map which represents the positions of the different ranges, and the names given to them by both the explorer and the Geographical Society. Another paper is a report of the same explorer's journey from Su-chau to Kulja. MM. S. N. Nikitin's and Pashkevich's paper on the altitudes of the region between the Volga and the Ural rivers, with a map, throws a good deal of new light on this interesting part of

Russia. The same issue (1894, V.) contains a very elaborate paper by A. I. Woeikoff on the variations and secular changes of climate; and a note on the earthquake in San-ju, China, is also worthy of mention.

As to the East Siberian *Izvestia* (vol. xxv. 1, 2, and 3), they contain a very valuable new list of altitudes obtained by levellings in Transbaikalia; two botanical papers on the vegetation in the Baikal region, by Y. Prein; a summary of the important and well-known discoveries made by the deciphering of the Runic inscriptions on the Orkhon and the Yenisei; and various notes (the Flamingo in Siberia, D. Klements's expedition to Mongolia, etc.).

The rich contents of the last (XVI.) volume of the Memoirs (*Zapiski*) of the Caucasian Branch of the Geological Society has already been mentioned in a previous issue of this *Journal*. We have, moreover, received the nineteenth volume of that extremely useful serial edited by the Caucasus Educational Department, the 'Collection of Materials for the Description of the Localities and Inhabitants of Caucasia,' which contains, besides a profusion of materials for Caucasian folklore, a history of Temir-khan-shura, and descriptions of the town Kvirily and several mountain villages.

Russian geographical literature has also been enriched during the past year by a new geographical periodical, which has at once taken a place of honour among geographical reviews generally. It is the review *Earth Knowledge* (*Zemlevyedyenie*) issued quarterly by the Geographical Section of the Moscow Society of Friends of Natural Sciences (*Lubiteli Estestvoznaniya*), under the editorship of D. N. Anuchin. The Moscow Society, which has rendered such immense service in almost creating Russian anthropology, and which is well known to geographers by its throughly scientific and rich edition of the late Fedchenko's scientific explorations in the Tian-shan, has lately founded a Geographical Section, which now edits the above review. Quite a series of excellent papers has already appeared in the four issues of the Moscow review, some of them of a general character—"The Problems of Earth-knowledge;" "The Historical Development of Conceptions on the Surface Structure of Russia;" "Recent Researches into the Lakes of West Europe, with some Data Relative to the Lakes of North-West Russia," by D. N. Anuchin; "The Reaction of Man upon Nature," by Dr. Woeikoff, etc.—while the remainder deal with some new points of the geography of the Russian Empire. In this last department we find a series of valuable papers, mostly well illustrated, on the lakes invaded by vegetation and periodically disappearing in the Onega region; on Mount Iremel; on different parts of Siberia; on the mountain groups and glaciers of the Caucasus; M. Pastukhoff's journey to the highest villages of Caucasia, and his ascent of the Shah-dagh; A. N. Krasnoff's botanical notes from a journey to the far East; on the sources of the Moskva river; on the Kirghiz steppes; on the Northern Urals; and so on.

Short notes on geographical exploration in Russia are another useful feature of this periodical, which certainly will widely contribute to the development of taste in geography in Russia.

The same Society is also issuing its quarto volumes of 'Memoirs' (*Trudy*), of which we see often mentioned (although we have not received it) A. N. Krasnoff's very interesting work, 'The Grass Steppes of the Northern Hemisphere.'

And, finally, the same Moscow Society has lately published in a separate volume, intended for a wider circulation, a collection of papers by Mme. Alexandra Potanina, accompanied by a touching biography (partly autobiography) of this remarkable lady traveller, who, like Mme. Olga Fedchenko and Mme. Chersky, not only accompanied her husband on all his journeys in Central Asia and China, but also was his faithful comrade and aid in collecting all sorts of information, geographical and ethnographical, about the visited countries. Thus she explored with her husband North-West Mongolia in 1876–77, Central Mongolia in 1879 and 1886, the Hansu borderlands of the East Tibet plateau and Lake Kokonor in 1884–86, and, finally, the least-known parts of East Tibet in 1892. She died in China, on October 1, 1893, before the caravan had reached the town Chu-sin-fu, where it was expected to find an English doctor, and her husband, broken down by this loss, returned soon to Europe. The collected papers of Mme. Potanina, contributed to various reviews, are lively descriptions of scenes from the life of the Buryates, and chiefly the Mongols.

Of privately issued geographical works we must mention a volume, 'China,' published at St. Petersburg by the General Staff, Colonel D. V. Putyata. It is a reliable description of the Chinese Empire, its inhabitants, its revenue and trade, as well as of the military forces of the empire and its frontier with Russia from the military point of view. The work is illustrated by sixteen small maps.

It may be said, in conclusion, that, owing to the recent efforts of the Geographical Society and the Moscow Friends of Natural Sciences, there will be no difficulty in not only indexing the whole of the Russian geographical literature, when the much-spoken-of international publication for this purpose will be started, but also to find thoroughly reliable analyses of the chief papers and works, which will have only to be translated for universal use. Even now the *Annuaries* of the Geographical Society, translated in full, would be found to be of great benefit for Western geographers.

While the above goes to press, we learn that the Russian Geographical Society has just issued the first volume of the 'Work of the Russian Polar Expedition to the Mouth of the Lena,' *i.e.* of the expedition which was sent out in 1881–84, and consisted of H. D. Jurgens, Dr. Ant. Bunge, and A. G. Eigner. The first half of this volume contains the astronomical and magnetical observations, while the second

part, edited by Dr. Bunge, is given to the description of the extremely interesting journey itself, and is full of interesting details relative to the flora and fauna of the country, the extension of forests and of ever-frozen soil, as well as the life of the Yakutes.

THE PORTUGUESE EMPIRE IN THE EAST.*

HAVING regard, on the one hand, to the peculiar interest attaching to the rapid rise to supreme power in the East of a nation possessed of such limited resources as Portugal, and on the other to the number of contemporary historians of that nation who wrote voluminous accounts of the doings of their countrymen, it is certainly surprising that so little should hitherto have been done to bring before English readers a connected account of the steps by which such vast results were attained. One of those historians, it is true, found an English translator two centuries ago; but in the case of the other and more standard writers, the voluminous nature of their works apparently proved a deterrent. It is, therefore, matter for satisfaction that Mr. Danvers should have followed up his official researches into the records—both English and Portuguese—relating to India and the East, by bringing together from such records, as well as from the above-mentioned sources, an account of "the principal events connected with the rise of the Portuguese nation, and with the development and decline of their Eastern Empire." The history of a period so extended—for, while directing his chief attention to the more stirring events of early conquest and international rivalry, the author traces the fortunes of the Portuguese possessions down to the present day—cannot, of course, be treated of exhaustively, even in the two thick octavo volumes now before us, but the connected view here presented cannot fail to be useful to all students of European enterprise in the East.

It is possible here to touch on a few only of the most interesting and eventful periods of the history, passing over the first opening up of intercourse with the East under Vasco da Gama and his immediate successors as more familiar to English readers than the history of its subsequent development, to which the ambitious schemes of the great Albuquerque contributed so largely. Mr. Danvers helps us to trace the influence, not entirely beneficial, of the policy of this great man on the future of the Portuguese power. Whilst others aimed merely at the opening of trade relations with the various Eastern nations, he sought to emulate Alexander the Great by the establishment of a vast territorial dominion, such as could not fail to overtax the resources of so small a country as Portugal. His zeal in this direction may be judged from the fact that of the three great Eastern emporia of commerce, whose traffic made so

* 'The Portuguese in Asia.' By F. C. Danvers. London: W. H. Allen. 1894.

much impression on mediæval travellers like Abd-er-Razzak, Varthema, and others, he had at the time of his death already subjugated two, Malacca and Ormuz, and was contemplating the completion of Portuguese ascendancy by the reduction of the third, Aden. According to his 'Commentaries,' * he had brought completely under his influence all the countries from Ormuz to Cape Comorin, while eastwards as far as China all the kings were in friendly relations with him.

From a geographical point of view, perhaps the greatest interest of the book lies in the facilities afforded for tracing the course of events by which, in the space of little over half a century, the coasts and seas of the whole of Eastern Asia, including the islands of the archipelago, were definitely made known to Europe. In so doing, we are struck by the quiet way in which such vast additions to the knowledge of the world were made, the history of actual discovery being not bound up with the names of great captains, such as those whose exploits in the New World were so fully chronicled by historians. This is due, no doubt, partly to the fact that accounts of the far East had already been given, however vaguely, by the mediæval travellers, and partly to the different political relations which prevailed, these being confined chiefly to the establishment of trade, or at most the erection of forts, along the coasts. Of the first expeditions to the Moluccas under Antonio de Abreu (1511), to China under Fernão Perez de Andrade (1516), and to Japan under Antonio de Mota (1542), we have to be content with very meagre details, and as a rule the individual voyages were on too small a scale and of too short duration to rank with those of the great navigators of the world. Those of Mendez Pinto, which, as regards their extent at least, might form an exception, are only incidentally referred to in the book.

The principal scene of the events treated of is of course India and the neighbouring countries, and here the reader may follow in detail the various wars with native rulers by which the Portuguese power was established on the West Coast; the operations in the Red Sea and Persian Gulf, with varying success, against the Turks, Arabs, and Persians; the part taken by the Portuguese in the native wars in Ceylon; their rivalry with the English and Dutch, and expulsion by the latter from Ceylon and the Archipelago; their struggle with the Mahratta power, and the decline of their influence on the Bombay coast, with a corresponding increase of that of the English; and the final decay of their power, due to a variety of causes, but principally to the exhaustion of revenue by misappropriation of funds, to the decline of trade owing to bad fiscal policy, and to the ill effects of the establishment of the Spanish dominion over Portugal.

The book is illustrated by reproductions of old maps, portraits, and views of places, and a copious index is added, the value of which is,

* An English version of which has been published by the Hakluyt Society.

however, lessened by the fact that under the main headings the separate entries are arranged, not chronologically, but alphabetically, the order thus depending merely on the chance form of words employed. This is especially to be regretted in a work covering such a wide extent, both of time and place, in which the details referring to any one person or region are necessarily scattered far and wide amidst the general mass.

THE GALÁPAGOS ISLANDS.*

By Dr. WOLF.

The position of the Galápagos is very isolated. They lie at a distance of 600 nautical miles from the South American continent, and 3000 miles from the nearest Polynesian Islands, the Mendoña Archipelago; and since at the time of their discovery by the Spaniards in the sixteenth century they were uninhabited, and owing to their general barren and stony character did not invite settlement, while up to the present day they have remained off the great trade-routes of the world, they have always attracted little attention. It was only in 1832 that the Republic of Ecuador took formal possession of them. Peru once or twice showed a disposition to annex them, and the United States attempted to acquire them by purchase, but still Ecuador remained in the end in undisturbed possession of them. Only within the last fifteen or twenty years, since the cutting through of the Central-American isthmus was set on foot, has the general interest been more directed to this archipelago, for it will lie on the main route from Panama to Polynesia and Australia, and form a most favourable point for the establishment of a coaling-station. Ecuador has likewise recognized the importance of the islands for the future, and has, since 1885, named a governor and other officials for them, although only one island is inhabited, and that by only two hundred persons. The islands were made known to science by Darwin during the voyage of the *Beagle*.

The group is scattered over a water-area of over 23,000 square miles, and yet the total land surface amounts to only 2870, of which 1650 fall to the largest island, Albemarle. Altogether there are thirteen islands, exclusive of the many small islets and rocks. The geological and topographical character of the islands is exceedingly plain and simple. They form one of the best examples of formation by volcanic action pure and simple, through the piling up of eruptive matter. Nowhere is an old non-volcanic formation to be seen, and nowhere is the simple geological structure disturbed by extensive displacements or dislocations, while even the surface has lost hardly anything of its original form by erosion. Both an older and a more recent period of eruption are to be observed. During the former the outbreak took place beneath the sea, and must have yielded an enormous mass of material, forming the basis on which the more recent sub-aerial peaks were raised above the exceedingly deep sea-bottom. Petrographically, the old volcanic products are distinguished by the presence of Palagonite and other stratified tuffs with the character of sandstone, whilst the more recent consist entirely of vast streams and layers of lava, almost devoid of tuffs.

The old tuff formation occurs nowhere in extended masses, but appears only sporadically in the form of horseshoe craters in the lowest parts of the islands, or

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* Paper read at the Berlin Geographical Society, April 6, 1895.

emerging from the sea, but never in the higher interior parts. Even from a distance they are distinguishable from the darker lava-formations by their smooth forms, their striking stratification, and their bright brownish-yellow colour. If they rise directly from the sea, they are more or less broken by the swell, but the open side or lowest edge always faces the south or south-east, a proof that as far back as the time of their origin the prevailing current had a direction from south-east to north-west. A regular and very gradual rise of the old volcanic area to the extent of about 350 feet has apparently taken place, for up to that height scanty remains of marine molluscs occur in the tuff-strata. Darwin estimates the number of the craters at over two thousand, and this is perhaps not above the mark, if we include all the cones of eruption, often little over 150 feet high at the foot of the crater-peaks; but it would be certainly incorrect, if one were to speak of that number of volcanoes, in the same way as we cannot speak of the numerous eruptive cones on the slopes of Etna as separate volcanoes. The number of volcanic peaks proper, connected by a funnel with the more deeply seated focus of activity, is very limited, and could not exceed twenty-five. There are several islands which, like Abington, Bindloe, Hood, etc., as well as Indefatigable and Narborough, consist of a mere volcanic peak. In other cases two or three neighbouring peaks coalesce into a continuous ridge, as is to be seen on Santiago, South Albemarle, and South Chatham. These last two islands long consisted each of two separate islands, which became united by the latest lava-flows, which in each case formed an isthmus not many feet above the sea-level. It is plain in all cases how the islands have been enlarged from fixed centres by copious lava-flows.

The height of the islands bears a relation to their area. The smaller attain a height of 650 to 1600 feet; the medium-sized (Floreana, Chatham, Santiago, and Indefatigable), 2000 to 2300 feet; while the largest, Albemarle, rises sheer from the sea at its south-west point to a height of 5000 feet. It is remarkable that its four great craters, as well as that of Narborough, all reach almost exactly the same height of 3700 feet. Darwin is inclined to divide the islands and their main craters into four lines, generally parallel, and with a south-east and north-west direction, and derives them from the same number of volcanic fissures. Such a grouping in lines seems, however, very arbitrary, and we might with equal force lay down other connecting lines, as, *e.g.*, one through the major axis of South Albemarle and Indefatigable. Such attempts at grouping seem purposeless, if only for this reason, that we do not know how the submerged members of the group, which certainly exist, are disposed over the common foundation; for, as some of these peaks raise only their highest points above the sea (*e.g.* Hood, Barrington, etc.), in like manner it is very probable that others do not reach the sea-level at all. To geologists it is particularly striking that this great volcanic region should be totally wanting in loose erupted matter, *i.e.* volcanic tuffs, with the exception of the above-mentioned old Palagonite-tuff and beds of volcanic sands and ashes, and in accumulations of large ejected blocks and bombs, if we disregard a deposit of basaltic pumice in certain bays on the east coast of Albemarle. The impression prevails that these volcanic mountains originated in fairly quiet but copious outflows of lava, at one time very viscid, at another very liquid in its flow. The great petrographic uniformity of the material of these islands, which is exclusively black or brown slaggy lava, usually feldspathic basalt, stands in marked contrast to that of the volcanic highlands of Ecuador, with their great variety of andesites. In this respect the Galápagos have their closest analogy, perhaps, in the basaltic lavas of the Hauran mountains in north Arabia. In any case the age of the group is, geologically speaking, very recent, and credible authorities even speak of volcanic outbreaks from the great crater of Narborough during the historic period, which,

for these islands, goes back only three hundred years. On the other hand, it is very difficult to attempt estimates of age in a land which is entirely wanting in the results of erosion and in sedimentary deposits, and where, except on the coasts, almost every stone still lies on the spot where the volcanic force placed it thousands of years ago.

The climate of the islands is largely influenced by the fact that they lie in the midst of the cold Peruvian current, which at Cape Blanco, in 4° S. lat., trends away from the Peruvian coast towards the north-west. The water-temperature among the islands only ranges between 70° and 74° Fahr., and the yearly mean is 11° lower than on the neighbouring continental coast of Ecuador. To the same local cause is to be attributed the great scarcity of rain, which in many years is entirely wanting, as on the Peruvian coast. The rainy period falls at the same time of year as that of West Ecuador, but is much shorter. In favourable years there are frequent bursts of thunder-rain, especially from February to April, but their effects are hardly perceptible in the lower parts, below the height of 800 feet. The rain is at once sucked up by the porous slaggy lavas as by a sponge, and sinks through, so that no permanent streams or springs are formed, and the scanty vegetation of the lower zone presents no fresher appearance in the wet than in the dry season. From May to January it never rains within the coast zone.

The conditions are very different in the upper region, above the height of 1000 feet. Although during the short rainy season proper the precipitation is not much more considerable than in the coast-region, during the long so-called summer the mountains are frequently, and from July to November almost perpetually, wrapped in thick mist and clouds, and these condense into the fine drizzling rain (garuas), which often falls uninterruptedly day and night, or at intervals five or six times in the day. It may be affirmed that on the upland regions it rains more in summer than in winter, and the perpetual moisture operates in a quite different way from the heavy but transient winter rain. Even here there is no formation of streams and springs, but the soil is equably and deeply saturated with moisture; the basaltic slaggy lava is decomposed, to an average depth of almost 2 feet, into a blackish-brown earth, and overspread with an evergreen covering of vegetation, certainly not luxuriant, but still thick and pleasing to the eye. The contrast between the lower dry and the upper moist zone is a surprising one, and the transition takes place very suddenly, especially on the west side of the islands. In some hollows of the upland region thin layers of clay have been deposited, which do not allow the water to percolate, and in such places shallow pools are formed, which become filled principally by the winter rain, and dry up entirely only in years with little rain-fall. They are surrounded by swamp-vegetation, and frequented by wild ducks. As a general rule the water sinks at once into the ground, and it is only on the larger islands at a few points in the middle and lower region that it sees the light again in the form of dropping springs. On the level sea-beach one often finds, on digging holes about 6 feet deep, brackish water which rises and falls with the tide, and which sometimes misses little of being drinkable. The scarcity of good and abundant drinking-water would prove a great obstacle in the way of future coloni-zation, in spite of the extremely healthy and pleasant climate. The temperature is subject to no great daily or yearly variations. In the lowest zone the mean amounts to about 70° to 72° Fahr., but in the two *haciendas* on Floreana and Chatham only to 66° at a height of 920 feet, and on the pampas of the higher regions, 1300 to 2000 feet above the sea, only to about 61° to 63°; whilst at an equal height on the mainland there is still a luxuriant tropical vegetation, with a mean temperature of 73° to 75° Fahr.

The vegetation of the two zones in the islands is entirely different, and scarcely

a dozen species could be found common to both. In the lower zone, up to 650 feet, the ground is very incompletely covered: black, brown, and red lavas everywhere crop out among the brushwood, which, as a rule, has small grey foliage and quite inconspicuous flowers. The plants that thrive best here are two gigantic cacti, one a columnar cactus 20 feet in height, and the equally tall *Opuntia galapageia*, which bears a green crown with pendent branches at the top of a tall and thick cylindrical stem. These two plants choose places where otherwise nothing grows, and often crown the edges of the craters of the black lava-cones. There are extensive districts—extending on Albemarle and Narborough to an area of several square miles—where absolutely nothing grows, and where the ground appears paved with enormous lava blocks. In the lower zone of Chatham, Darwin obtained only 10 species of plants, and must have collected in a very barren spot, for the number may be estimated at 50 to 60 species. The shore vegetation apparently contains not one endemic form, and agrees with that of the mainland, even some growth of mangroves having established itself in favourable localities. The transition from the lower to the upper zone is formed by a peculiar intermediate zone, which is characterized especially by a bearded lichen, and which occupies a height of 650 to 800 feet above the sea. This lichen occurs in such quantities on all the shrubs and trees, with tufts a yard long, that the zone to which it gives its impress can be distinguished as a horizontal white stripe even from a distance on board ship.

At a height of 800 feet the scene suddenly changes: a fresh, damp, south-east wind is met with on the plateaux, and the level ground is covered like a meadow with a short thick turf, while patches of wood and bush, covered with thick foliage, are dotted about the surface as in a park, or clothe the slopes of the higher ridges in more continuous masses. The trees have as a rule thin stems, and are seldom much over 30 feet high. This wooded region is followed, at heights between 1600 and 2000 feet, by a zone bare of trees and shrubs, but covered with coarse tufted grass, which naturally attains a considerable extent on the larger islands only. The vegetation of the islands is entirely wanting in tropical characteristics, the eye being greeted by no palms or tree-ferns, and by no beautiful or striking flowers. Although the upper region is in part very fertile, scarcely a tenth of the whole surface is cultivable.

The fauna is just as peculiar as the flora. Only one indigenous mammal is known, a rodent of the size of a rat; but even this is rare. The domestic animals, which have now run completely wild, seem not to have existed in Darwin's time. On Floreana and Chatham there are large herds of wild cattle as well as goats; on Indefatigable numerous troops of donkeys; pigs on Santiago especially; whilst a large reddish-yellow dog is to be met with on all the islands, and fine cats—strange to say, all black—live in the bare lava-clefts of the sea-shore. All these animals seem to thrive well in the climate of the islands, which secures immunity from tropical pests and vermin.

The tameness of the land-birds which Darwin noticed, can be fully confirmed at the present day. Some were captured by the writer, which settled on his head and shoulders; and in Albemarle even a falcon, which is plentiful there, would approach so near that numbers could be killed with a stick. On the other hand, all the swimming and wading birds, with the exception of an indigenous gull, are extremely shy; so that on the Galápagos the tameness or shyness of the birds can be taken as a pretty certain guide in deciding whether they are indigenous or the reverse.

The first place in the animal world is taken by the scaly reptiles. Snakes were found on four of the islands, and a different species on each. They were easily caught, and not poisonous. Small lizards are very common, the most remarkable

being the genus *Amblyrhynchus*, peculiar to the Archipelago. *A. cristatus* is the only living representative of the marine saurians; it attains a length of over 3 feet, and at ebb-tide hundreds are to be seen sunning themselves on the damp lava-rocks. When captured they made no attempt to bite, and seem to live entirely on seaweed. On account of its taste of train-oil, their flesh is not eatable. On the other hand, the flesh of the land species, *A. Subcristatus*, has a very good flavour.

The elephant-tortoise (*Testudo elephantopus*) is well-nigh exterminated on the larger islands, which are most frequently visited. It lives in both zones, but prefers the upper moist one. Its flesh is excellent eating, and the liver, fried in oil derived from the fat which surrounds the viscera, is one of the greatest delicacies.

THE MONTHLY RECORD.

THE SOCIETY.

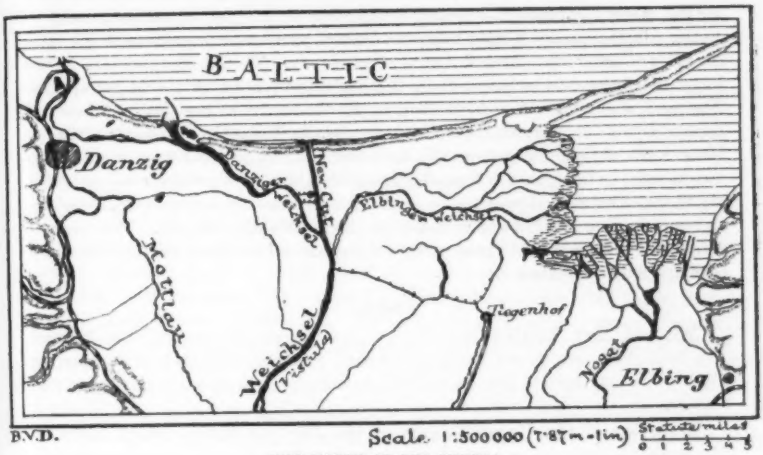
The French Government and the Recent International Geographical Congress.—Mr. Clements R. Markham, C.B., F.R.S., President of the Society and of the recent International Geographical Congress, has received the following gratifying communication from the French Ambassador: "Ambassade de France à Londres, 21 Novembre, 1895. Monsieur,—Le Gouvernement que je représente, sensible au gracieux accueil que vous avez bien voulu ménager aux délégués français qui ont assisté aux séances du Congrès Géographique tenu à Londres sous votre Présidence au mois de juillet dernier, m'a chargé de vous faire parvenir un témoignage de sa satisfaction. Il m'est particulièrement agréable d'être en cette circonstance l'interprête des sentiments du Gouvernement Français, et je suis heureux de saisir cette occasion pour y joindre l'expression de ma consideration personnelle. Veuillez agréer, Monsieur, les assurances de mes sentiments les plus distingués.—ALFD. DE COURCEL." "La témoignage de sa satisfaction" consists of a blue Sèvres vase.

Memorial to the late Lord Aberdare.—A committee has been formed at Cardiff for the purpose of obtaining funds for a memorial to the late Lord Aberdare. It is proposed to erect a statue of bronze at Cardiff, and to devote the surplus of the fund to the formation of a scholarship or fellowship in the University of Wales, of which Lord Aberdare was the first Chancellor. The Council recommend this memorial to the liberality of the Fellows of the Society, to which Lord Aberdare rendered eminent service as President and Trustee. Subscriptions should be sent to Henry Jones Evans, Esq., Lloyd's Bank, Cardiff.

EUROPE.

New Channel for the Lower Vistula.—At the cost of about one million pounds sterling, the branch of the Vistula which passes by Danzig to the sea has been deprived of further power to endanger the neighbourhood during river floods, and converted into a tranquil canal, suited for use as a harbour for timber-rafts. A new channel about 5 miles long has been cut from the point where the river

swerved westward from its northerly direction; and through this channel practically the whole volume of the river has flowed directly northward to the Baltic since April last. The main mouth is now 12 miles distant from Danzig, but communication



NEW MOUTH OF THE VISTULA.

with the small branches running eastward has not been disturbed. The main object of the new work is to allow the ice of the Vistula to be carried quickly and harmlessly out to sea with the accompanying flood water in early spring.

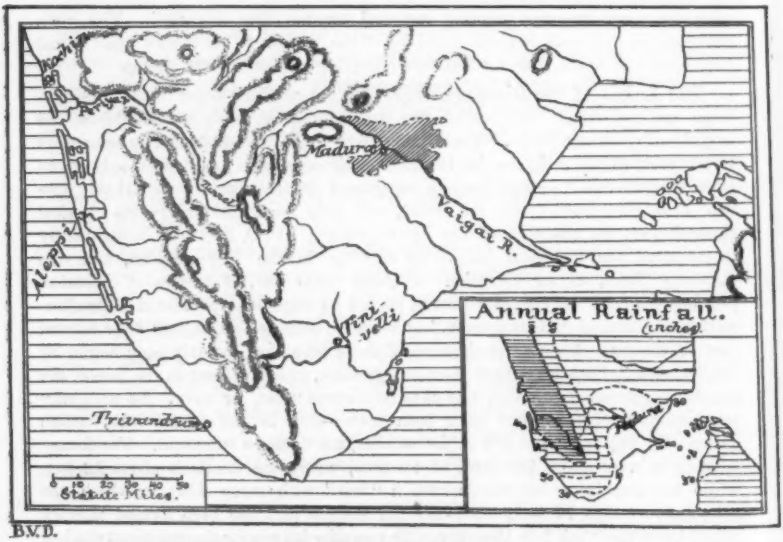
The Lakes of the Riesengebirge.—On the northern slopes of the Riesengebirge are two small lakes, called the large and small "Koppenteich," from the neighbouring Schneekoppe. These lakes were made the subject of investigation as far back as the thirties by Count von Schweinitz; but it was only about 1880 that Professor Joseph Partsch recognized in their basin a remarkably fine type of a glacier-bed of the ice period, and they are mentioned in his classical researches on the glaciation of the Riesengebirge. Dr. O. Zacharias subsequently investigated the biological conditions existing in the Koppenteiche, and the discovery there, at an elevation of nearly 4000 feet, of species of *Monatas*, previously known only in the oceans, played an important part in the then unsettled question of "Reliktenseen," or isolated lakes, which at one time formed part of the sea. A second exploration of these lakes has recently been begun by Dr. Zacharias. Both lakes have steep craggy sides, which, at least in the case of the smaller Koppenteich, surround it so as to form a true "kar," or corry. An unusually large number of soundings have been made—350 in the larger lake, which covers only 16¼ acres, and 300 in the smaller, not 6½ acres in extent. The former is shallow over about one-third of its area, where the depth is about 12 feet, while the remaining two-thirds form a "tub" with steep sides, in which the soundings average 75 feet: obviously the shallow part has been formed through filling up of the "tub" by landslips. The smaller lake is for the most part shallow (about 12 feet), with a depression close to the steep western shore, to a little over 20 feet. The origin of the large lake is traced to a landslip, in accordance with the views of Count von Schweinitz and Partsch, the dam having been formed by the higher and more extended side of the slip. At the beginning of summer

the temperature of the water rises almost suddenly; in the smaller lake ice disappears about the end of May, and in the larger about a fortnight later. The estimations of the plankton, according to its weight and quantity, were made by the methods employed by Dr. Zacharias in the Plöne lake, in Holstein, and gave for the larger Koppenteich 3·4 cubic centimeters of plankton in one cubic meter of water. In the smaller Koppenteich, the bulk of microscopic organisms in the same quantity of water was about 3·9 cubic centimeters. The smaller numbers in the larger lake were counterbalanced by the higher proportion of the larger species. The mud, which forms a uniform covering on the bottom of the smaller lake at all depths below 12 feet, was examined for Dr. Zacharias by Professor Brün, of Geneva, one of the greatest experts in the lower plant-forms; and the interesting fact was brought to light, that in these German mountain lakes some species occur which are characteristic of *Alpine* basins (e.g. *Diatoma necsodon* and several *Melosiræ*), and one peculiar to Norwegian mountain lakes (*Melosina solida*). The investigations are to be continued next year, with special reference to seasonal variations of temperature, plankton, etc.

ASIA.

Mr. and Mrs. Littledale.—We are glad to learn by telegram that Mr. and Mrs. Littledale have arrived safely at Srinagar, Kashmir, from their journey across Tibet. We may hope to hear an account of their travels at an early meeting of the Society.

Diversion of the Upper Course of the Periyar River, South India.—The project—discussed at various times from 1808 onwards, but only put into



B.V.D.

DIVERSION OF THE UPPER PORTION OF THE PERIYAR RIVER.

execution in 1887 upon plans prepared by Colonel Pennycuick—for diverting the upper course of the Periyar from its normal direction towards the west coast, and carrying it across the watershed to the opposite side of the peninsula, has lately

been completed. Its object is to draw upon the superabundant water-supply of the western slope derived from the moisture-laden south-west monsoon, for the benefit of the area to the east, which is always exposed to the risk of famine, owing to its small and precarious rainfall. In former times irrigation was supplied here by a system of tanks, but these have to a large extent become silted up, so that rice has been for many years grown on a very small area. Such, however, is the wealth of running streams on the west, that in spite of the diversion of the head stream of the Periyar, its tributaries still supply all that is needed by the inhabitants on its banks, while the resulting greater immunity from disastrous floods is a positive benefit to them. Details of the scheme as finally adopted are to be found in the report published in 1886 by the Public Works Department. The necessary works included the erection of a dam 155 feet high across the valley of the Periyar, to form a reservoir capable of containing 13,000 million cubic feet of water (*i.e.* a lake as large as Windermere), the piercing of a tunnel 6650 feet long through the ridge of the watershed, and works necessary for controlling the supply from the reservoir down to the valley of the Vaigai, into which the new supply is directed, as well as those for irrigation in the same valley, by which an area of 220 square miles in the Madura plain will be fertilized. This is shown by shading in the accompanying map. The difficulties of the undertaking were increased by the nature of the country—jungle-clad, malarious, and uninhabited—and the altitude (2800 feet) to which the materials had to be dragged up steep slopes with an average gradient of 1 in 15, four large unbridged rivers also having to be crossed on the way from the nearest railway station. Water-power was utilized in the work wherever possible, and altogether the best economy of force was practised, with a result that the total cost of this beneficent undertaking has been less than half a million sterling at the present rate of exchange, on which outlay the direct profits should yield a handsome return.

The Mohammedan Insurrection in Kansu.—It may be useful to call attention to the information respecting the Mohammedans in Kan-su, to be found in Mr. Rockhill's 'Diary of a Journey in Mongolia and Tibet' (1894). The particular tribe now in revolt is that of the Salar, who live in the Yellow River valley to the south of Hsi-ning Fu, and among whom Mr. Rockhill travelled in 1891 and 1892. His description of them and their country occurs in Part II. of his book. The name Dungans (Tungani), by which the Mohammedan population of Kansu and other parts of the Chinese empire was generally known during the former rebellion, does not seem to apply to any particular race (cf. Prjevalsky's 'Mongolia,' note by Sir H. Yule, vol. ii. p. 304), and the same is the case with the Chinese appellation Huei-huei, both terms being used of the Mohammedans of those regions in general, to whatever race they may belong.

Trade in Northern Persia.—Two consular reports lately issued deal with the trade statistics for the districts around Meshed and Resht respectively. The new frontier tariff about to be introduced by the Russian government, caused large quantities of goods to be hastened across the frontier, while the present unstable state of exchange has, from a combination of causes, given British goods the advantage. The new Russian regulations, introduced in January last, forbid the importation of European and Anglo-Indian goods with some exceptions, of which tea is one. A clause giving special facilities for the despatch by Batum, Baku, or Uzanada, of green teas destined for Transcaspia and Bokhara, is likely to cause a revolution in the trade of Khorasan, it being probable that other goods also will in time be attracted to the new route. If this is the case, the trade between India and Khorasan will become quite insignificant, as the

merchants will find it does not pay to maintain agents in the country, and when once the paper ruble becomes cheaper in Meshed, British piece-goods will be unable to compete with the Russian. The exports from Khorasan include large quantities of cotton, wool, and wheat; enormous quantities of cotton-seed having lately been distributed by Russian speculators, and the resulting decrease in the cultivation of wheat, together with its wholesale export, has caused bread to become dear, and even threatened famine.—Mr. H. L. Churchill's report, written from Resht, gives returns for the Province of Ghilan for 1893–94, and for that of Astrabad for 1892–93. In the former, silk culture is reported to be gaining ground, the bulk being exported to Marseilles. The price of rice has steadily risen year by year in sympathy with a similar rise at Baku, until the facilities afforded for the import of Indian rice at the latter place have caused a sudden fall. An increased quantity of tobacco has been produced. Sugar (from Russia) continues to be the principal import, but a Belgian company proposes to establish a factory in the country. Some remarks are made by Mr. Churchill on the various means of communication in use, and illustrated by a sketch-map. He recommends the dredging of the bar of the harbour of Enzelli (the port of Resht), so as to render it accessible to the mail steamers of the Caspian, and also the construction of a landing-stage on the shore of the lagoon of Murd-ab, behind Enzelli. After some general remarks on the routes in the province of Astrabad, leading to its port of Bender-i-gez, and comments on previous reports on the province, Mr. Churchill notes the small use made of the fine forests of the province, and shows the advantages that would result from the introduction of steam saw-mills. Full tables of imports and exports accompany the reports.

AFRICA.

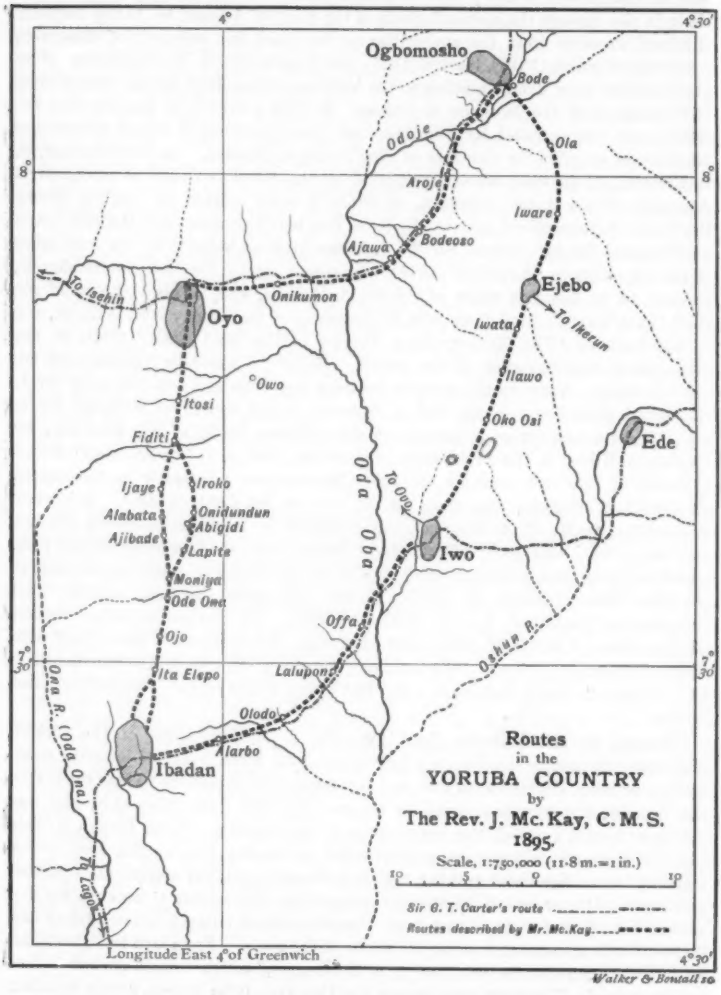
Dr. Donaldson Smith's Somaliland Expedition.—Early in November Dr. Donaldson Smith reached Aden, having completed what has been apparently a most successful journey in the Somali and Galla countries. A brief telegram sent from Aden to the Society on November 4 gives some indication of the route followed since the date of our previous intelligence (*Journal*, vol. v. p. 124). It will be remembered that, owing to the opposition of the Abyssinians, Dr. Smith, after reaching Sheikh Husein, on the upper waters of the Shebeli river, had been forced to return eastwards in the hope of avoiding the Abyssinians by crossing the Shebeli further south and making his way through the territory of the Borani Gallas to Lake Rudolf. In this he seems to have been successful. According to the telegram, he first visited Lake Stefanie, and thence proceeded to the north end of Lake Rudolf, striking the course of the river Nianam, which, according to Teleki and Von Höhnel, empties itself into the latter lake. Thence he made his way southwards to Korokoro, on the upper Tana, finally reaching the coast at Lamu. Dr. Smith has thus been the first traveller to reach Lake Rudolf from the north, and connect the surveys from that direction with those of travellers from the south. Between that lake and the Tana he must likewise have traversed a considerable extent of unexplored country. The traveller may be expected to reach England shortly and supply a full account of his explorations, which will be read with much interest. We have yet to learn whether the question of the connection of the Omo river with Lake Rudolf has been finally settled by this journey.

Ashanti.—In view of the interest now directed to Ashanti, it may be useful to notice briefly some of the works from which information as to the country and its inhabitants may be obtained. In spite of the yearly increasing volume of modern African literature, it cannot be said that a large amount of attention has been paid to this particular part of the continent, and the greater proportion of works specially

relating to Ashanti dates either from the first half of the century or from the time of the last British campaign. Although the intercourse of European nations with the neighbouring Gold Coast began as early as the sixteenth century, when English merchants, among others, frequented the coast in quest of gold and slaves, it was only in the present century that travellers penetrated inland as far as Kumasi. Early in the century the encroachments of the King of Ashanti led to the despatch of several missions from the authorities on the coast, and accounts of these were written by Bowdich (1819), Hutton (1821), and Dupuis (1824). The last-named gives historical and other details relating to the kingdom, taken from Arabic manuscripts or obtained from the Moslems of Guinea. In 1841 a sketch of Ashanti and the Gold Coast was compiled by John Beecham, from the works of former writers and information supplied by members of the Wesleyan Mission. In 1843 the Rev. T. B. Freeman, of the same mission, published an account of two visits to the country. Accounts of the British campaign of 1873–74 were written by Captain Henry Brackenbury (from official sources), by H. M. Stanley ('Coomassie and Magdala'), and by Winwood Reade. Colonel Sir W. F. Butler gives an account of his own share in the campaign in 'Akimfoo' (1875). Of recent works, the best information is, perhaps, to be found in those of Colonel A. B. Ellis, who, in his 'History of the Gold Coast' (1893), deals fully with the relations of that colony with Ashanti, and in his book on 'The Tshi-speaking Peoples of the Gold Coast,' treats of the ethnological characteristics of the people. Papers in scientific Transactions are not numerous. Notes on the country between the Volta and the Niger, by Sir J. Glover, are to be found in the R.G.S. *Proceedings* (old series, vol. xviii. pp. 286 *et seq.*); and an account of a journey to the northern limits of the kingdom, by Captain B. Kirby, in the *Proceedings*, new series, 1884, p. 447 (with map); whilst a sketch of the work done by the Basel Missionaries, principally in the eastern parts of the kingdom, was given in the volume for 1888 (p. 246). A journey to Bontúku, by Mr. R. A. Freeman, was described in the *Supplementary Papers*, vol. iii. p. 119. Surveys by officers under orders from the Government have been embodied from time to time in maps published by the Intelligence Department of the War Office, of which, in addition to one just issued, we may mention that compiled by Captain J. I. Lang (published 1893). Various parliamentary reports on the affairs of the Gold Coast deal also with the relations of the colony with Ashanti, those for 1882 and 1885 including the official reports by Captain Lonsdale on a mission to Yendi, Salaga, etc., and by Captain Kirby on the journey mentioned above.

Routes in the Yoruba Country.—Mr. J. McKay, agent of the Church Missionary Society in the Yoruba Country, sends us some notes of journeys made by him between Ibadan the capital, and Ogbomosho (Ogbomawshaw) near the north-east frontier, with sketch-maps of the routes. The first route followed by him was *viâ* Oyo (Awyaw), one of the large towns of the country. From Ibadan to this place there are two alternative roads for a part of the way, which again unite before reaching Oyo. Near each end the road is wide and good, but elsewhere is narrow and stony. One or two of the streams crossed has a fair supply of water in the dry season, but others dry up at that time. Besides several villages, isolated farms and market sheds are scattered along the whole of the route. From Oyo to Ogbomosho again there is an alternative route by a "bush-road," which though shorter is bad and little used. The main road crosses the Odo Oba (Oba River), a very winding stream with swift current, fordable in the dry season, but crossed by canoes in the rains. The passage is difficult, owing to the volume and rapidity of the current. Beyond this hills are seen to the right, two prominent peaks standing out alone. Along the whole route patches of forest are passed, but not of any great extent.

One or two deep ravines have to be crossed. On a subsequent journey Mr. McKay travelled *vid* Iwo, to the south-west of Oyo. On this route the forest is much more continuous, with clearings containing farm-compounds. The Odo Oba, here in a very rocky bed, and crossed with great difficulty (in large tubs) in the wet season,



is passed before reaching Iwo, a walled town half the size of Ogbomosho. Beyond this some bare and precipitous hills are passed on the right. The forest is again entered before Ejebo, another walled town, smaller than Iwo, is reached, and after crossing the River Odoje, Ogbomosho is entered from the south-west.

On Akik as a Future Trade-Centre.—At the Ipswich meeting of the British Association, a paper was read on the "Port of the Upper Nile in Relation to the Highways of Foreign Trade," by Mr. James Turnbull Playfair Heatley. He proposed the introduction of the term "nodality" for a commercial centre on a through line of trade, in accordance with a suggestion of Mr. Mackinder's in 1889. He then discussed the relative merits of Alexandria, Sawakin (with Sheikh Barud), Massawa, Mombasa, Tanga, and Chinde, as ports with their respective trade routes, and stated the case for Akik. He stated that the port of Akik is on the best bay of the Red Sea, and that a line of railway from Akik to Khartum by way of Goz Rejeb is the best route to bring Khartum and the Upper Nile into commercial relations with the maritime highways of trade. As the merits of different routes are decided by the importance of the nodalities which feed the highway of trade, he pointed out that the trade of the Habab and the Hagar districts would come to Akik. The important district of Tokar has been described as the granary of the Eastern Sudan, and is recognized as its key strategically. Here would also come the trade of the Beni Amr tribes from the valleys of the Anseba and the Baraka. At Filik there is the fertile district of the Gash. From Filik a line of some 50 miles to Kasala would tap the provinces of Taka, Gadarif, Galabat, and Senaar. As soon as a line is made to Goz Rejeb, the port of Akik would be in direct communication with the Upper Nile from June to September, during which time the Atbara and the Nile at the Sixth Cataract are navigable. From Akik to Goz Rejeb the distance is from 260 to 280 miles; the highest part of it is 1650 feet, with easy grading and no difficulties. To Goz Rejeb as a nodality, where routes meet from all parts, the trade of the Upper Nile, of Darfur and Dongola, can come by ship and caravan. But the importance commercially and strategically of Khartum demands the line from Goz Rejeb, a distance of some 180 miles. From Khartum the Nile, with some of its tributaries, is navigable for some 1500 to 1700 miles. The Blue Nile is navigable for 350 miles; the Sobat for 150 to 300 miles; the Bahr el Ghazal for 400 miles; the Bahr el Arab for 500 miles. The Nile itself—the Bahr el Abiad and the Bahr el Jebel—is navigable from Khartum to Kiri, a distance of 1068 miles. From Kiri, which is a fine district, and its Nile port, an important nodality, a line of some 50 miles to the mouth of the Unyama would bring the trade by ship from the lands in the basin of the Bahr el Jebel, the Victoria Nile, the Albert lake, and the Albert Nile. From the mouth of the Unyama a line might be made up the valley for some 50 miles to Fatiko, which is a fine district, and from Fatiko to Fauvera, some 70 to 80 miles, whence the Victoria Nile is navigable to Urondogani, some 160 to 180 miles. Thus Mr. Heatley considers that there is a feasible highway of trade from Usoga, Unyoro, and Uganda, and most of Kitara to Akik, as the port of the Upper Nile.

AMERICA.

Early French Explorations in the Interior of Guiana.—M. Henri Froidevaux, secretary to the Bureau Colonial près la Faculté des Lettres de Paris, has contributed to the *Bull. de Géog. historique et descriptive* (1894) an account of several entirely forgotten French journeys in the interior of Guiana made between 1720 and 1742, and this account has recently been republished in a separate form (Paris: Imprimerie Nationale, 1895). His attention was first drawn to some of these journeys by the discovery of a manuscript in the National Library, and further discoveries in the same library and in the French colonial archives made him acquainted with other journeys, and enabled him, in some cases, to determine the routes with more or less exactness. Where this has been found possible, he has

furnished sketch-maps of the routes based on M. Coudreau's map of French Guiana in the *Bull. Soc. Géog.*, 4e trimestre, 1891. The authorities on which his accounts are based are published in an appendix. The first of these journeys—Oct.-Nov., 1720—was due to the initiative of the colonial governor, Captain Claude de Guillouet, seigneur d'Orvilliers, its object being the discovery of certain gold mines reported by Indians. This journey was fruitless, but a subsequent journey led to the discovery, near the sources of the Oyapok, of a forest about ten leagues in extent, consisting almost exclusively of cacao trees, and this became the object of several other journeys, made with the encouragement of the colonial government. In one of these the explorer appears to have reached as far south as the Falls of Despair, on the Yari (Amazon basin). These journeys in quest of the cacao forest were ultimately given up on the part of the government, owing to the failure of the attempts to find a sufficiently easy route to bring down the produce of the forest in large quantity; but it would appear, from sundry notices, that down to 1735 private individuals continued to visit the region to collect small quanties of cacao. One interesting discovery was made in the course of one of these early journeys that had another object. Some Indians having reported that at the falls of the Oyapok, about the place where the river begins to be navigable, five or six days' journey above the confluence of the Camopi, the rocks are all covered with *caracoli*—a name which the Indians apply to both gold and silver—the governor sent out an expedition to determine the truth of this report; but the leader of the expedition found, on reaching his destination, that this so-called caracoli was nothing else than leaves of talc scattered all over the rocks. In this M. Froidevaux finds a confirmation of the explanation furnished by M. Crevaux ("Voyage en Guyane, 1877," *Bull. Soc. géog.*, 1878, pp. 413, 414) of the legend of Eldorado, which he believes to be based on the existence of caves of micaceous rocks, the Indians in their fantastic narratives confounding scales of mica with gold.

Gravity Measurements in the United States.—Mr. G. K. Gilbert has contributed to the *Bull of the Philosoph. Soc. of Washington* (vol. xiii.) a paper on the results of a transcontinental series of gravity measurements by G. R. Putnam, made in 1894. The observations were made at twenty-six stations, eighteen of which follow one another at fairly systematic intervals along the 39th parallel as far west as Salt Lake City. The general result is to show that the value of gravity is large on the sea-coast as compared with the interior.

Discovery of a Large River in Canada.—We learn that Dr. R. Bell, of the Canadian Geological Survey, in the course of his exploration of the land lying south and east of James bay, the southern extremity of Hudson bay, found that the whole district is the basin of a large river, which was not previously known. The river-basin extends from the watershed of the Upper Ottawa in 48° N. to James bay in 51° 30′, and its range in longitude is from 74° to 80° W. It is practically covered with continuous forest. The river, which flows in a north-north-westerly direction for about 250 miles, and receives three great tributaries from the east, is navigable for steamers for a considerable distance. A full account of Dr. Bell's interesting journey across the largest blank space in the map of Southern Canada will shortly be published.

AUSTRALASIA AND POLYNESIA.

Explorations in Central Borneo in 1893 and 1894.—In 1893 the Amsterdam Society for the promotion of scientific investigations in the Dutch colonies organized an expedition for explorations principally in Central Borneo. The scientific members were J. Büttikofer, conservator of the Royal Museum for zoology

at Leiden; A. Hallier, assistant in the Herbarium of the Botanical Gardens at Buitenzorg; Dr. G. A. F. Molengraaff, professor at the University of Amsterdam, as geologist; and Dr. A. W. Nieuwenhuis, military surgeon in the Dutch Indian army, representing medicine, anthropology, and ethnography. The members of the expedition made their arrangements independently of each other, the zoologist staying at various stations for a considerable time at each, the botanist changing his stations more frequently, the anthropologist visiting the scattered settlements of the Dayaks, while the geologist travelled over as much ground as possible, making use of the rivers so far as he could to reach favourable points for observation in the mountains. The results of the exploration are to be published in a collected form by the organizing society; but meanwhile Dr. Molengraaff has contributed to *Petermanns Mitteilungen*, 1895, No. ix., a summary account of the geological survey. His first important station was at Nanga Raun (that is, "Raun-mouth") on the Mandai, a left-bank tributary of the upper Kapuas. This is in the midst of a picturesque region of wild tablelands and mountains to the south of the headwaters of the Kapuas, composed of terraces of volcanic tuffs, and eroded here and there into a number of isolated peaks. These mountains stretch from west 10° south to east 10° north, to the boundary of West Borneo (about 114° east), and have been named by Dr. Molengraaff the Müller mountains, in memory of Georg Müller, an explorer who had reached this region from the east (the Mohakkam basin), and was killed here early in 1826. The Seberuang, a left-bank tributary of the Kapuas lower down, was next visited, and here some fossils of Cretaceous age were found for the first time in Borneo. Then, passing to the north of the Kapuas, Dr. Molengraaff visited a group of *danaus*, or inundation lakes, which, when the waters are at a medium height, form a continuous sheet of water about 60 square miles in extent; in drier periods become converted into a number of lakes connected by numerous channels or swampy tracts; and in very dry seasons, once every two or three years, get dried up almost entirely. Thence he proceeded further north to the mountains bordering on Saráwak. These mountains were afterwards visited further east. They are described as a true mountain system formed by folds of the earth's crust, rising abruptly on the Dutch side from the plain, and having a mean trend of west 5° south to east 5° north, and increasing in width and height towards the east. In the western part clay-slates with innumerable quartz veins predominate; in the eastern, flint, siliceous slates, and sandstones. Dr. Molengraaff proposes to call these mountains the Upper Kapuas Fold-mountains (*Faltungsgebirge*). They are entirely without human settlements. The only inhabitants are wandering Dayaks, locally called Bukats, and also known as Punans. Dr. Molengraaff's last journey was southwards by a route crossing a plateau to the south of the Müller mountains (Madih plateau), to the mountains which separate West from South-West Borneo. There he ascended the Bukit Raya, the highest peak as yet known in Dutch Borneo (7475 feet). These mountains he proposes to call, in honour of C. A. L. M. Schwaner, a traveller who visited them in 1848, the Schwaner mountains—if, he says, the name of mountains can be given to an elevated strip rising above the adjoining country on both sides, and crowned by rounded summits, ridges, and peaks, but forming in reality the edge of a plateau sloping gently towards the north. The water-parting between the basin of the Kapuas and that of the Kitangan was crossed to the east of the Bukit Raya, and the Samba, a northerly tributary of the Kitangan, was ultimately reached. The Samba is a considerable stream, not less than 150 feet broad, traversing a hilly country composed of granite, said to be mostly covered with primeval forest, and of great fertility. The Kitangan winds lazily through a swampy country, yielding little for the geologist. The report is accompanied by a map on the scale of 1: 2,000,000, showing Dr. Molengraaff's routes. This map, it

is said, may be depended on for the accuracy of the river-courses, these being laid down in accordance with the data obtained by the topographical brigade of the Dutch-Indian army in the survey begun in 1886, and now approaching its completion.

Meteorological Observatory on Mount Wellington, Tasmania.—Mr. Clement L. Wragge, the enthusiastic mountain meteorologist to whose efforts the establishment of a meteorological station on Ben Nevis is due, had the satisfaction of opening an observatory hut on Mount Wellington, near Hobart, on June 30. The summit of this mountain is 4000 feet above sea-level, and the observations at the top will be simultaneous with those at a sea-level station, so that in position it is an exact analogue of Ben Nevis. The hut which has been erected is, in the mean time, intended merely as a shelter for an observer who ascends periodically; but it is hoped that arrangements will be completed by which regular hourly observations may be taken. The newspaper account from which we take our information gives a clear idea of the value of this site to meteorology: "The great value of Ben Nevis lies in the fact that the mountain lies directly in the track of Atlantic storms, precisely as Mount Wellington lies in the direct track of the Antarctic V-shaped disturbances which produce the heaviest gales and most stormy weather on the southern seaboard of Australia and around Tasmania. Mr. Wragge established the Ben Nevis observatory in 1881, and its value has been clearly shown in the *Transactions of the Royal Society of Edinburgh*. Dr. Buchan's remarks in that regard apply, Mr. Wragge asserts, with almost equal force to Mount Wellington as the most valuable sister observatory in this hemisphere. Mr. Wragge is convinced that if hourly observations could be secured at Mount Wellington and Hobart, and be placed side by side with similar observations at Ben Nevis and its collateral low-level station at Fort William, results would be forthcoming of the greatest possible value to meteorologists and students of physical science in every part of the world."

POLAR REGIONS.

Proposed German Antarctic Expedition.—Our Berlin correspondent informs us that at the meeting of the German Antarctic Committee on November 3, it was decided to make an effort to combine the schemes of the projected German Antarctic expedition and the Austrian artistic polar expedition, proposed by Herr von Payer, in a joint German-Austrian expedition to the Antarctic regions. For this purpose it was resolved to endeavour to bring together a fund of about £50,000 for the purchase and equipment of the necessary ships. The result of the effort will be awaited with interest. The report published in several English newspapers, that the money had already been secured, is unfounded.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

The Theory of Deserts.—In the *Annales de Géographie* for October, 1895, Professor de Lapparent discusses the origin and essential characteristics of deserts. He shows how they are due in every case to the control exerted by the primitive land-form on the precipitation or on the drainage of rainfall. In the case of depressions, especially those below sea-level, the air, heated thermo-dynamically by its descent into them, has acquired the capacity of taking up more water-vapour, and consequently evaporation is stimulated and precipitation checked. Again, at great elevations the low temperature separates the water-vapour from the air in the solid form, and so prevents the formation of rain. The control of drainage is still more interesting, and its results in a great measure have not been recognized hitherto. Calcareous rocks and surface soil of great porosity remove water so

rapidly from the surface that streams cannot establish themselves or produce their typical modelling of the surface. In depressions the effect of evaporation prevents the formation of a permanent base-level, and the establishment of stream-lines becomes difficult, while wind-borne sand tends to accumulate and divert rivers, splitting them into many shallow channels, on which evaporation acts rapidly. These conditions tend to intensify themselves, and any revolution of the land-surface which interrupts the typical slope from watershed to sea favours the formation of an arid area. M. de Lapparent draws the general conclusion that the desert type is always due to the powerlessness of fluvial erosion, and that in consequence the desert land-forms are characteristically incomplete, the normal land-modelling agencies having been prevented from finishing their work.

Origin of the Loess in China.—The remarkable formation known as loess, which extends for about one million square miles in the Chinese Empire, is of special geographical interest, on account of the influence it exerts on all the surface features of the region where it is found. Baron Richthofen's theory that the loess originates from wind-borne dust carried from the arid interior and brought to the ground by the increasing moisture of the atmosphere, has been for some time in competition with the suggestion that the deposit is of fluvio-glacial origin. Messrs. Skertchly and Kingsmill have recently studied the surface formations in Shan-tung, and the last number of the *Quarterly Journal of the Geological Society* (vol. 51, p. 238) contains a paper in which they bring forward a new theory. They argue, that since Northern and Eastern Asia have not been subjected to the same sort of glaciation as Europe, therefore loess is in no way connected with glacial action. Where undisturbed, this formation shows plain marks of stratification; and as the authors reject the theory of æolian origin, and find enormous difficulties in assuming it to be a fresh-water sediment, they have "been driven to ascribe to it a marine origin." They point out that it has been subject to enormous denudations and rearrangement, and that it is succeeded by extensive marine sands and old valley gravels. They farther find that zoological, ethnological, historical, and traditionary evidence points to the former depression of Asia beneath the sea, and the subsequent desiccation of the land after re-elevation. The evidence brought forward in support of these conclusions did not appear to be accepted as complete by the geologists who discussed the paper. Here, therefore, is a field in which travellers in China and Central Asia may hope to find, by careful observation, the material for interesting theoretical conclusions. The finding of undoubted sea-shells in inland loess would be a very strong piece of evidence.

The Intellectual Value of Physical Geography.—Mr. Albert Peny Brigham contributes to the last number of the *Bulletin* of the American Geographical Society, an interesting paper on the "Composite Origin of Topographic Forms." He shows that in the classification of land forms by a genetic standard, it is not enough to look at one cause as sufficient to account for the present form of a land surface, because several agencies simultaneously at work have had a share in producing the final result. Although he is inclined to view this method of classification, so strongly upheld by Professor W. M. Davis in America, as one of considerable difficulty, he is very strongly convinced of its value, both from the scientific and the educational points of view. He sums up, "The teacher of Physiography has no greater reward than is his when a student assures him that henceforth his native state will be to him a new country, or that he shall see the hills and valleys of his old home with new eyes. This is precisely because he has learned to interpret the forms in the light of their origin; to read the work of the frost, the rain, and the plant; to measure the achievement of the river, with

perception of its past and prophecy of its future; or to see where the glacier has traced its unmistakable inscription. Every journey becomes fraught with meaning, and the traveller who has caught the spirit of modern geography will not report the great plains of Kansas and Nebraska as 'uninteresting.' It must, however, still be said that many colleges deny their graduates this appreciative eye. But even the secondary and earlier grades cannot much longer deprive their pupils of this best fruit of geographic study."

The Areas of Land and Sea.—Professor Hermann Wagner has lately made a re-calculation of the area of the different land-masses of the globe, and discussed the results in various ways, which will be described in full in Professor Gerland's *Beiträge zur Geophysik*. A preliminary announcement was made in the *Scottish Geographical Magazine* of April last, with special reference to the work of Dr. Murray published in that journal. The total area of land, making certain assumptions as to the probable proportion of land and sea in the unknown polar regions, was given by Dr. Murray in 1886 as 55,697,400 square miles, and Professor Wagner's new result is 55,814,000 square miles; in other words, the two estimates are practically identical. The difference comes when the distribution of the land in latitude is considered. Professor Wagner availed himself of the determinations of the area of the various continents by Strelbitski, Wisotzki, and Trognitz, after testing the work in each case, and he finally checked his results in a singularly neat and satisfactory way. He took the areas of the ocean in different zones of latitude as worked out by Dr. Karstens in the course of his recent calculations of the mean depth of the oceans (see *Geographical Journal* for September, vol. vi. p. 267), and, deducting these from the mathematically calculated areas of the zones of the spheroid, obtained the area of the land by difference. The two sets of figures agreed very closely, but in some cases they deviated rather widely from Dr. Murray's results. Professor Wagner concludes with the following estimate of the proportions of land and sea in the different zones:—

Latitude	80°–70° N.	70°–60° N.	60°–50° N.	50°–40° N.	40°–30° N.	30°–20° N.	20°–10° N.
Percentage Land	28·8	71·4	56·9	53·3	42·8	37·6	26·3
Percentage Sea	71·2	28·6	43·1	47·7	57·2	62·4	73·7

Latitude	10° N.–0°	0°–10° S.	10°–20° S.	20°–30° S.	30°–40° S.	40°–50° S.	50°–60° S.
Percentage Land	22·8	23·6	22·1	23·1	11·4	3·2	0·8
Percentage Sea	77·2	76·4	77·9	76·9	88·6	96·8	99·2

The final ratio of land to water for the whole globe is 1 : 2·54.

Survey of Glaciers by Photography.—Mr. Otto J. Klotz describes in the *Journal of Geology* (vol. 3, p. 512), the method he adopted, while with the Canadian surveying party on the Alaska Boundary expedition, for studying the Baird Glacier photographically. By using a horizontal camera of fixed focal length, provided with points of reference which appear in each picture and serve to fix the horizon of the camera, and photographing the face of the glacier from the ends of a measured base at a measured distance from the glacier, it was possible to make a complete map of the glacier so far as it was visible both in its horizontal and its vertical extent. The work was so accurate that, by taking photographs from the same standpoint at a comparatively short interval of time, all the changes in the glacier due to surface melting and to onward flow could be detected and measured. Thus between July 13 and August 11, 1894, an interval of twenty-nine days, the ice-front was lowered 2·1 feet by melting, and had advanced 29 feet, or at the rate of one foot per day.

OBITUARY.

Dr. Robert Brown.

Dr. Robert Brown, whose sudden death on October 26 deprived the Society of a Fellow of thirty years' standing and a member of Council, was perhaps the most widely known exponent of popular geography of the present generation. He approached geography from the side of natural science, his special study having been botany. To distinguish his writings from those of his celebrated namesake, Dr. Robert Brown of Montrose, he designated himself "Campsterianus," from the little estate of Campster, in Caithness, where he was born in 1842. He studied at the University of Edinburgh, where he took the degree of M.A., and afterwards at Leiden, Copenhagen, and Rostock, from the last of which universities he afterwards received the degree of Ph.D. Being of an adventurous disposition, he went out to British Columbia, and was in command of an exploring expedition sent to open up Vancouver island in 1864, the printed report of which in the Society's library contains a series of unpublished sketches by the author. After extensive travels through British North America, he took part in Mr. E. Whymper's expedition to the west coast of Greenland in 1867, taking charge of the natural history collections, and he also devoted attention to the glaciers. From his observations on the vast masses of inland ice in Greenland, he obtained the strong convictions on the erosive power of ice which he expounded and defended in the papers published in vols. xxxix. and xli. of the *Journal* of this Society, and which he retained to the last. After a few years spent in Glasgow and Edinburgh, engaged in literary work, and for some time as a lecturer in the School of Arts, now the Heriot-Watt College, Dr. Brown came to London in 1876. For the last twenty years of his life he was engaged mainly in journalism and in the preparation of popular works, most of which were published in a serial form by Messrs. Cassell and Co. These included the 'Peoples of the World' in six volumes, 'The Countries of the World' in six volumes, 'Science for all' in five volumes, 'Our Earth and its Story' in three volumes, and 'the Story of Africa' in three volumes. In these Dr. Brown had not an opportunity to exercise his full powers; some of the books were adaptations from foreign works, and others compilations. They have proved popular, and have undoubtedly done much to disseminate the results of geographical science, if not to advance geographical thought. His more important works include a 'Manual of Botany,' a number of papers embodying his early researches and observations published in *Petermann's Mitteilungen* and the Transactions of various societies (up to 1883 the Royal Society Catalogue records 44 titles), and the 'Bibliography of Morocco,' in which he collaborated with Sir R. Lambert Playfair. For many years Dr. Brown spent his holidays in visiting the Barbary States, and the study of the history and bibliography of the Mediterranean border of Africa was a continual delight to him. The work was published in the last volume of the 'Supplementary Papers' of the Royal Geographical Society. Dr. Brown had completed the work of editing a new edition of Pary's 'Leo Africanus' for the Hakluyt Society, with an introduction and elaborate notes. At the time of his death he was actively engaged in passing the work through the press. In private life he was genial and kindly. He was fond of talk with intimate friends, and his conversation was remarkably copious, easy, and entertaining, full of anecdote and incident derived from his years of travel in all latitudes, and of rare and curious and often out-of-the-way knowledge, in which his early predilection for botany often reappeared. In nothing did he show himself

more amiable than in his readiness to help others in any way he could. The reply to any request for information on any subject to which he applied himself, was sure to be prompt and full, and the same promptitude was shown in rendering any other service which it was in his power to do.

MEETINGS OF THE ROYAL GEOGRAPHICAL SOCIETY, SESSION 1895–1896.

First Ordinary Meeting, November 11, 1895.—CLEMENTS R. MARKHAM, ESQ., C.B., F.R.S., President, in the Chair.

Opening Address by the President.

The Paper read was:—

"Progress of the Jackson-Harmsworth Arctic Expedition." By Arthur Montefiore, F.G.S.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By HUGH ROBERT MILL, D.Sc., *Librarian*, R.G.S.

THE following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Com. = Commerce, Commercial.
C. R. = Comptes Rendus.
Erdk. = Erdkunde.
G. = Geography, Geographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
J. = Journal.
M. = Mitteilungen.
Mag. = Magazine.
P. = Proceedings.
R. = Royal.
Rev. = Review, Revue, Revista.
S. = Society, Société, Selskab.
Sitzb. = Sitzungsbericht.
T. = Transactions.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

EUROPE.

Alpine Lakes. *Petermanns M.* 41 (1895): 225–233. **Halbfass.**

Tiefen- und Temperaturverhältnisse einiger Seen des Lechgebiets. Von Dr. W. Halbfass. *With Map.*

A note on Dr. Halbfass's work will appear in the Monthly Record.

Alps—Mont Blanc. *C.R.* 121 (1895): 477–483. **Janssen.**

Sur une ascension au sommet du Mont Blanc et les travaux exécutés pendant l'été de 1895 dans le massif de cette montagne. Note de M. J. Janssen.

This will be referred to in the Monthly Record.

Europe—Climate and Prices. *G.Z.* **1** (1895): 39–51, 100–108. **Brückner.**

Dér Einfluss der Klimaschwankungen auf die Ernteerträge und Getreidepreise in Europa. Von Prof. Dr. Eduard Brückner.

Europe—Steppes. *G.Z.* **1** (1895): 152–163. **Nehring.**

Die Ursachen der Steppenbildung in Europa. Von Prof. Dr. A. Nehring in Berlin.

France—Loire. *Ann. G.* **5** (1895): 108–111. **Gallouédec.**

Mémoire inédit de Lavoisier sur la navigabilité de la Loire. Par M. L. Gallouédec.

France—Lot. *C.R.* **121** (1895): 576–578. **Martel.**

Sur de nouvelles observations dans le gouffre de Padirac (Lot). Note de M. E.-A. Martel. *With Plan.*

France—Lot. **Martel.**

Le Gouffre de Lantouy (Lot). Extrait du Bulletin de la *Société Scientifique, Historique et Archéologique de la Corrèze* (siège à Brive), tome xvii. Par E.-A. Martel. Size 10 × 6½, pp. 7. *Presented by the Author.*

France—Lot. **Martel.**

E.-A. Martel. Le Refuge de Roc de Gorp (ou d'Ancor) sous l'oppidum de Murcens (Lot). Brive: Imp. Roche, 1895. Size 10 × 6½, pp. 12. *Illustrations. Presented by the Author.*

France—Normandy and Brittany. **Hare.**

North-Western France (Normandy and Brittany). By Augustus J. C. Hare. London: G. Allen, 1895. Size 8 × 5½, pp. 410. *Map and Illustrations. Price* 10*s.* 6*d. Presented by the Publisher.*

Mr. Hare's Guidebooks to France are particularly adapted for the use of persons interested in architecture and in the historical associations of places. This volume, like those which preceded it, may be read with interest by others than tourists. It abounds in long French quotations, and a few of the hints to travellers are somewhat obscure; for example, of one hotel we read, "Very good, but *horrors.*"

France—Rhone, etc. **Bourdon.**

B.S.G. Paris **15** (1894): 70–95; **16** (1895): 75–111, 219–265.

Le Cañon du Rhône et le Lac de Genève. Par G. Bourdon.

France—Rivers. *Ann. G.* **5** (1895): 25–49. **Davis.**

La Seine, la Meuse, la Moselle. Par M. W. M. Davis. *With Maps.*

This treatment of French rivers by Professor Davis is similar to his discussion of the rivers of the South of England in the *Geographical Journal*, vol. v. p. 127 (1895).

France—Vosges. **Delebecque.**

Les lacs des Vosges. Par [M. André Delebecque]. Extrait des Comptes rendus de la Société de Géographie (Séance du 21 juin 1895). Size 9 × 6, pp. 6. *Presented by the Author.*

Germany—Saxony. **Wittstock and Scheiner.**

Forschungen zur deutschen Landes- und Volkskunde . . . herausgegeben von Dr. A. Kirchhoff. Neunter Band. Heft 2. Volkstümliches der Siebenbürger Sachsen, von O. Wittstock. Die Mundart der Siebenbürger Sachsen, von Dr. A. Scheiner. Stuttgart: J. Engelhorn, 1895. Size 9½ × 6½, pp. [138]. *Plates.*

Germany—Silesia. **Partsch.**

Forschungen zur deutschen Landes- und Volkskunde . . . herausgegeben von Dr. A. Kirchhoff. Neunter Band. Heft 3. Die Regen Karte Schlesiens und der Nachbargebiete, entworfen und erläutert von Dr. Joseph Partsch. Stuttgart: J. Engelhorn, 1895. Size 9½ × 6½, pp. [40]. *Map.*

Germany—Southern. **Baedeker.**

Southern Germany, including Wurtemberg and Bavaria. Handbook for Travellers. By Karl Baedeker. With 16 Maps and 15 Plans. Eighth Revised Edition. Leipsic: Karl Baedeker; London: Dulau & Co., 1895. Size 6½ × 4½, pp. xxviii. and 266. *Price* 5 *marks. Presented by Messrs. Dulau & Co.*

Gibraltar. *Nineteenth Century* (1895): 814–827. **Adye.**

The Past and the Future of Gibraltar. By Lieut.-Col. John Adye. *With Map.*

The map shows the proposed harbour on the west side of the rock of Gibraltar, and the article describes the projected works with reference to previous projects of a similar kind.

Iceland—Ice-mountains. *G. Tidskrift* 13 (1895): 56–60. **Thoroddsen.**

Et to Hundrede Aar gammelt Skrift om islandske Jøkler. Af Dr. phil. Th. Thoroddsen.

An account of the literature bearing on the ice-mountains and glaciers of Iceland in the seventeenth century.

Mediterranean. **Cavan.**

With the Yacht, Camera, and Cycle in the Mediterranean. By the Earl of Cavan, K.P. London: Low & Co., 1895. Size 8 × 5½, pp. xvi. and 94. *Illustrations. Price* 12*s.* 6*d. Presented by the Publishers.*

This is a practical guide to the Mediterranean yachtsman written in the best possible style, as the simple narrative of an actual cruise, with hints and suggestions to others who may follow at every point. There are nearly a hundred photographs, all good and serviceable in giving an idea of the chief Mediterranean harbours such as the yachtsman wants and cannot get from the charts. It is incredible that Lord Cavan never saw a cloudless sky on his trip, yet every photograph shows clouds, sometimes of great density, though the shadows are sharp as if the sun were brilliant. If these clouds be the work of the reproducers, it robs the series of much of their geographical value.

Rumania. **Richard.**

La Roumanie à vol d'oiseau. Hydrologie, géologie, richesses minérales, eaux minérales, pétrole, etc. Par A. de Richard. Bucarest: J. Göbl Fils, 1895. Size 9½ × 6½, pp. 424. *Plates. Presented by the Author.*

Books on Rumania in the languages of Western Europe are rare, and hence M. de Richard's description of the mineral wealth of the country will prove of great utility.

Russia. *B.S.G. Marseille* 18 (1894): 242–264; 19 (1895): 277–283. **Saint-Yves.**

Le Connaissance Géographique de la Russie en France du XVI^e^ an XIX^e^ Siècle. Par M. G. Saint-Yves.

Russia—Finland. ——

Exposé des Travaux Géographiques exécutés en Finlande jusqu'en 1895. Communication faite au Sixième Congrès International de Géographie, à Londres, 1895, par la Société de Géographie de Finlande. Helsingfors, 1895. Size 10 × 7, pp. 154.

This will be referred to in the Monthly Record.

Sweden—Stockholm. **Wittmann.**

Wegweiser des Schwedischen Touristenvereins, No. 10. Stockholm, die Hauptstadt Schwedens. Aus dem Schwedischen übertragen von Reichsarchivrath Dr. P. Wittmann, München. Stockholm, Wahlström and Widstrand [1895]. Size 7 × 10, pp. 150. *Illustrations. Presented by the Publishers.*

Turkey—Macedonia. **Naumann.**

Macedonien und seine neue Eisenbahn Salonik-Monastyr. Ein Reisebericht von Dr. Edmund Naumann. Munich and Leipzig: R. Oldenbourg, 1894. Size 10 × 7, pp. 58. *Map. Presented by the Author.*

An account of the author's travels in Asia Minor in connection with the construction of the Salonika-Monastir railway.

United Kingdom—England—Devon. **Murray.**

A Handbook for Travellers in Devon. Eleventh Edition. With Maps and Plans. London: John Murray, 1895. Size 7 × 4¼, pp. [42], 292, and 16. *Price* 7*s.* 6*d. Presented by the Publisher.*

The revision of this handbook has been thorough, and the work is equipped with an entirely new set of maps and plans. The sectional map of Devonshire coloured in contours, by Bartholomew, gives an admirable view of the physical features of the country, and elucidates the sites of the towns and villages.

United Kingdom—England—Gloucestershire. **Murray.**

A Handbook for Travellers in Gloucestershire. Fourth Edition, Revised. With Map and Plans. London: John Murray, 1895. Size 7 × 4½, pp. viii., [18], and 186. *Price* 6*s*. *Presented by the Publisher.*

This volume completes the new edition of the Handbook for Gloucester, Worcester, and Hereford, which has now been entirely reissued in the form of three thoroughly revised and portable volumes. The absence of town-plans is a matter of regret.

United Kingdom—Geological Survey. **[Geikie.]**

Appendix E. Annual Report of the Geological Survey and Museum of Practical Geology for the year ending December 31, 1894. 1895. Size 9½ × 6, pp. [34]. *Presented by Sir A. Geikie, Director-General of Geological Survey.*

ASIA.

China. **Morrison.**

An Australian in China, being the narrative of a quiet journey across China to British Burma. By G. E. Morrison. London: Horace Cox, 1895. Size 9 × 6½, pp. xii. and 300. *Map and Illustrations. Presented by the Publishers.*

This is a pleasant narrative of a somewhat unusual journey which the author carried out successfully from Hankow up the Yangtse to Chungking, thence by Suifu, Chaotong, Tongchuan, and Yunnan into Burma through the Shan states. There are many interesting comments on Chinese life and customs.

China. **Rosthorn.**

Eine Reise im westlichen China. Von Arthur von Rosthorn. Vortrag gehalten am 23. October, 1894, in der k. k. Geographischen Gesellschaft in Wien. Separatabdruck aus den Mitth. der k. k. Geogr. Ges. 1895. Heft 5 u. 6. Vienna, 1895. Size 9 × 6½, pp. 36. *Map. Presented by the Author.*

The paper is given in the *Mittheilungen* of the Geographical Society of Vienna, vol. xxxviii. pp. 285–320.

China—Lo-fou Mountains. **Bourne.**

The Lo-fou Mountains: an Excursion. By F. S. A. Bourne. Hongkong: printed by Kelly & Walsh, 1895. Size 8½ × 5½, pp. 48. *Map. Presented by the Author.*

Descriptions of visits to the monasteries and temples on the Lo-fou mountains near Canton in the summers of 1892 and 1894. It is illustrated by a sketch-map, and contains some statistics of height and position determined at the time. A pleasant description of life in a Taoist monastery is included.

India—Bengal. *J.R. Asiatic S.* (1895): 523–535. **Phillips.**

Mahnan's Account of the Kingdom of Bengala (Bengal). By George Phillips.

This account of Bengal by a Chinese traveller comes nearly midway between that of Ibn Batuta in 1341 and of Vasco da Gama in 1521. The embassy from China was a very large one, comprising, according to the record, 30,000 soldiers and 62 ships, and it sailed in 1405.

India—Punjab—Gujranwala District. ———

Gazetteer of the Gujranwala District Revised Edition, 1893–94. Compiled and published under the authority of the Punjab Government. Lahore, 1895. Size 10 × 7, pp. ii., vi, 188, and xliv. *Map. Presented by the Secretary of State for India.*

India—Railways. **Bisset.**

Administration Report on the Railways in India for 1893–94. By Lieut.-Colonel W. S. S. Bisset. London: Eyre and Spottiswoode, 1894. Size 13½ × 8½, pp. 256. *Map and Diagram. Price* 2*s*. 9*d*.

This report has been noticed in the *Journal* for July, 1895, vol. vi. p. 80.

India—Sport. **Braddon.**

Thirty Years of Shikar. By Sir Edward Braddon, K.C.M.G. Edinburgh and London: W. Blackwood and Sons, 1895. Size 9 × 6, pp. x. and 374. *Map and Illustrations. Price* 18*s*. *Presented by the Publishers.*

Sir Edward Braddon, in these reminiscences, describes sport in many parts of India,

in Lower Bengal, Oudh, and the Terai; and with the hunting-stories are interwoven memories of the rule of the Company, and a thrilling chapter on the Santhal country during the Mutiny.

Persian Kurdistan. *Blackwood's Mag.* (1895): 736–753. **Harris.**

Wanderings in Persian Kurdistan. By Walter B. Harris.

The record of a journey in 1895.

Siam—Ancient Maps. **Marcel.**

Gabriel Marcel. Notice sur quelques cartes relatives au Royaume de Siam. Extrait du "Siam Ancien." Par M. Lucien Fournereau. Paris: E. Leroux, 1894. Size 11½ × 9, pp. 44. *Facsimile Maps. Presented by the Author.*

An account of the cartographical development of Siam, with reproductions of the maps.

Siberia—Waterways. *Petermanns M.* 41 (1895): 234–242. **Jürgensohn.**

Sibiriens Wasserstrassensystem und Mitbewerb auf dem Weltmarkte. Nach dem Russischen bearbeitet von Arved Jürgensohn. *With Map.*

The map shows the waterways described in the paper for the district between the Pechora and Ob, and between the Angara and Lena, with the roads connecting the different river systems prominently indicated.

Tibet—Ethnology. **Rockhill.**

Smithsonian Institution. United States National Museum. Notes on Ethnology of Tibet. Based on the collections in the U.S. National Museum. By William Woodville Rockhill. From the Report of the U.S. National Museum for 1893, plates 665–747, with plates 1–52. Washington, 1895. Size 10 × 6½, [pp. 82]. *Presented by the Author.*

Mr. Rockhill's intimate personal acquaintance with Tibet eminently fits him for the work of describing the Tibetan collections of the United States National Museum.

Turkey in Asia. **Cuinet.**

La Turquie d'Asie. Géographie administrative, statistique, descriptive et raisonnée de chaque Province de l'Asie-Mineure. Par Vital Cuinet. Tome Quatrième. Fascicule 12 (Fin de l'Ouvrage.) Paris: E. Leroux, 1895. Size 11 × 7½, pp. [123]. *Map.*

M. Cuinet's great work on Asiatic Turkey is completed with this part, and it will be noticed as a whole in the *Journal*.

AFRICA.

Abyssinians. **Glaser.**

Die Abessinier in Arabien und Afrika. Auf Grund neuentdeckter Inschriften. Von Dr. Eduard Glaser. Munich: H. Lukaschik, 1895. Size 10 × 6½, pp. xii. and 210. *Presented by the Author.*

This work will be specially noticed.

East Africa—Ruwenzori. *Q.J. Geolog. S.* 51 (1895): 669–680. **Elliot and Gregory.**

The Geology of Mount Ruwenzori and some adjoining regions of Equatorial Africa. By G. F. Scott Elliot and J. W. Gregory.

East Africa—Somaliland. **Swayne.**

Seventeen Trips through Somáliland: A Record of Exploration and Big Game Shooting, 1885–1893. Being the narrative of several journeys in the Hinterland of the Somáli Coast Protectorate, dating from the beginning of its Administration by Great Britain until the present time; with descriptive notes on the wild fauna of the country. By Captain H. G. C. Swayne. London: Rowland, Ward & Co., 1895. Size 9½ × 7, pp. xx. and 386. *Maps and Illustrations. Price* 18*s. Presented by the Publisher.*

A record of exploration, adventure, and sport, capitally illustrated. No book gives clearer or more practical directions as to arranging a hunting-party in Somaliland.

German East Africa. **Schmidt.**

Deutschlands Kolonien, ihre Gestaltung, Entwickelung und Hilfsquellen. Von Rochus Schmidt. Erster Band. Ost-Afrika. Berlin: Schall & Grund [1894]. Size 7½ × 5½, pp. xxii. and 296. *Map, Portraits, and Illustrations. Price* 5*s.*

Captain Rochus Schmidt had considerable experience in command of the German troops in East Africa. He gives in this volume the history of German East Africa, and a short account of its physical and economic condition.

Madagascar. **Paisant.**

Marcel Paisant. Madagascar. Deuxième Édition. Paris: Librairie Larousse [not dated: 1895]. Size 10 × 6½, pp. 144. *Map and Illustrations.*

This little book gives very compactly an account of the geography, fauna and flora, ethnography, political and social institutions, history, and exploration of Madagascar. The last section is accompanied by sketch-maps of the routes of the principal travellers. The neighbouring French islands—Diego-Suarez, Sainte-Marie de Madagascar, Nosybé, and the Comoros—are briefly described.

Mauritius. *Q.J. Geological S.* **51** (1895): 463–471. **Haig.**

The Physical Features and Geology of Mauritius. By Major H. de Haga Haig. *With Map.*

A note summarizing the results of this paper appeared in the *Geographical Journal*, vol. v. (1895), p. 597.

Sudan—Adamaua. **Passarge.**

Adamaua. Bericht über die Expedition des Deutschen Kamerun-Komitees in den Jahren 1893–94. Von Dr. Siegfried Passarge. Berlin: D. Reimer, 1895. Size 11½ × 8, pp. xvi. and 574. *Portrait, Maps, and Illustrations. Presented by the Publisher.*

This work will be specially noticed.

NORTH AMERICA.

British North America—Labrador. **Bryant.**

A Journey to the Grand Falls of Labrador. By Henry G. Bryant. Reprint Geographical Club—Bulletin No. 2 [Philadelphia, 1894]. Size 9½ × 6, pp. 48. *Maps and Plates. Presented by the Author.*

Canada—Quebec. *P. and T.R.S. Canada* **12**, 1894 (1895): 63–70. **Laflamme.**

L'Eboulis de St. Alban. Par Mgr. Laflamme. *With Sections.*

Account of a great landslip in April, 1894, by means of which the course of a river was completely changed. A plan of the old and new river-courses, with sections showing the structure of the country, illustrate the memoir.

Canada—Sable Island. *P. and T.R.S. Canada* **12**, 1894 (1895): 3–49. **Patterson.**

Sable Island: Its History and Phenomena. By the Rev. George Patterson, D.D. *With Map.*

This memoir contains (1) a Description of the island; (2) Notices by early voyagers, 1500–1600; (3) Notices from the removal of La Roche's colonists till the establishment of the first life-saving station, 1601–1801; (4) First relief establishment on the island, 1801–1809; (5) History of relief establishment, 1809–1848; (6) Life on the island, 1848–1855; (7) To the present time, 1855–94; (8) Physical history of the island, and its probable future. As an appendix, a list of 191 ships wrecked on Sable island since 1801 is given.

United States—Triangulation. **Gannett.**

Results of Primary Triangulation. By Henry Gannett. Bulletin of the United States Geological Survey, No. 122. Washington: Government Printing Office, 1894. Size 9 × 6, pp. 412. *Plates. Presented by the U.S. Geological Survey.*

The triangulation carried out by the U.S. Geological Survey during the last twelve years was for the purpose of controlling the 1-inch topographical map, and no higher accuracy was aimed at.

United States—Washington. *B. American G.S.* **27** (1895): 239–255. **Bogue.**

Stampede Pass, Cascade Range, Washington. By Virgil G. Bogue. *With Map and Illustrations.*

Account of the adventurous expedition across the Cascade Mountains in 1880 while looking for a practicable route by which the Northern Pacific Railway could cross the range.

CENTRAL AND SOUTH AMERICA.

Brazil—Bahia. **Vianna.**

Memoir of the State of Bahia, written by the order of the Right Honourable Governor of the State of Bahia, Dr. Joaquim Manuel Rodriques Lima,

by the Director of the Public Archives, Dr. Francisco Vicente Vianna, assisted by . . . José Carlos Ferreira. Translated into English by Dr. Guilherme Pereira Rebello. Bahia: Office of the "Diario da Bahia," 1893. Size 9 × 6, pp. 682 and xxviii. *Presented by the Governor of Bahia.*

A work prepared for the Chicago Exhibition.

British Guiana—Roraima. *Timehri* 9 (1895): 107–188. **Quelch.**

A journey to the Summit of Roraima. By J. J. Quelch.

Mr. Quelch, with several friends, experienced no difficulty in reaching the summit of Roraima, and would have remained there several days but for their native carriers, who insisted on leaving at once. Good photographs of the summit were obtained, and some collections made of birds and plants from the rugged plateau.

Central America—Archæology. **Maudslay.**

Biologia Centrali-Americana; or Contributions to the Knowledge of the Fauna and Flora of Mexico and Central America. Edited by F. Ducane Godman and Osbert Salvin. Archæology. By A. P. Maudslay. [Part V., July, 1895.] (Vol. III. pp. 1–24.) London: R. H. Porter and Dulau & Co. Size 13 × 10½. *Illustrations. Plates I.–XXV. (separate)*, size 13 × 20½.

This instalment gives an account of the ruins of Chichen Itza, in Yucatan. The map of Yucatan, which prefaces the accompanying plates, contains some additions by the author.

Guiana. *Timehri* 9 (N.S.) (1895): 1–20. **Rodway.**

Some Spanish Accounts of Guiana. By the Editor [James Rodway].

Timehri is recalling to the colonists of British Guiana the stirring times of the early history of the country. In addition to Mr. Rodway's account of the Spanish explorers, the present number contains a long extract from Purchas' *Pilgrimes* on Captain Leigh's first settlement in 1604.

Sarmiento's Voyages. **Markham.**

Narratives of the Voyages of Pedro Sarmiento de Gamboa to the Straits of Magellan. Translated and Edited, with Notes and an Introduction, by Clements R. Markham, C.B., etc. [Hakluyt Society Publications, No. XCI.] London: Printed for the Hakluyt Society, 1895. Size 9 × 6, pp. xxx. and 402. *Presented by the Hakluyt Society.*

The voyages of Sarmiento as here translated form a most fascinating chapter in the history of adventurous exploration, and they are enriched by a series of valuable notes and an introductory biography of the voyager, which greatly heighten the interest of the whole.

AUSTRALASIA AND PACIFIC ISLANDS.

Australia—Physical Geography. **Thomson.**

P. and T. Queensland Br. R.G.S. Australasia 10 (1895): 85–131.

Presidential Address—The Physical Geography of Australia. By J. P. Thomson.

Mr. Thomson appends to his paper a number of statistical tables relating to mountains, rivers, etc., which cannot fail to be useful for reference.

New South Wales—Broken Hill. *Contemporary Rev.* (1895): 358–362. **Frewen.**

A Visit to Broken Hill. By Moreton Frewen.

This paper incidentally contains an interesting comparison between the physical and economic conditions of New South Wales and California.

New Zealand. **Smith.**

Report of the Department of Lands and Survey, New Zealand, for the year 1894–95. By Stephenson Percy Smith. Wellington, 1895. Size 13¼ × 8¼, pp. xvi. and 182. *Maps and Plates.*

New Zealand Alps. *Contemporary Review* (1895): 190–211. **Fitzgerald.**

In the New Zealand Alps. By E. A. Fitzgerald. *With Map.*

This paper deals with a journey, also mentioned in the *Alpine Club Journal* 17 (1895), 469–475.

New Zealand—Aorangi. *New Zealand Alpine J.* **2** (1895): 29–38.

The First Complete Ascent of Aorangi. A New Route from the Hooker side. Extracted from Mr. T. C. Fyfe's Account in the Otago *Daily Times* of February 21st, 1895.

The Second Ascent of Aorangi (Zurbriggen's).

South Australia. **Woods and Wilson.**

The Province of South Australia. Written for the South Australian Government by James Dominick Woods, with a Sketch of the Northern Territory, by H. D. Wilson. Adelaide: C. E. Bristow, Government Printer, 1894. Size 8½ × 5½, pp. 446.

Tasmania. **Walker.**

The Discovery of Van Diemen's Land in 1642; with notes on the localities mentioned in Tasman's Journal of the Voyage. By James Backhouse Walker. Hobart: W. T. Strutt, 1891. Size 8¼ × 5¼, pp. 16. *Presented by the Author.*

The Author advocates the restoration of the original names to some of the bays and headlands of Tasmania.

Tasmania and Norfolk Island. **Walker.**

The Deportation of the Norfolk Islanders to the Derwent in 1808. By James Backhouse Walker. I. The Settlement of Norfolk Island. II. The Deportation to the Derwent. Hobart, W. Grahame, jun., 1895. Size 8¼ × 6, pp. 26. *Presented by the Author.*

This is noticed in the Monthly Record.

POLAR REGIONS.

Antarctic Expedition. *Nineteenth Century* (1895): 706–712. **Markham.**

The Need for an Antarctic Expedition. By Clements R. Markham, C.B.

Antarctic Exploration. **Southwell.**

Antarctic Exploration (Illustrated). By Thomas Southwell. Reprinted from *Natural Science*, Vol. VI. No. 36, February, 1895. Size 10 × 6¼. *Presented by the Author.*

Antarctic Meteorology. *Petermanns M.* **41** (1895): 245–247. **Supan.**

Die meteorologischen Beobachtungen der "Antarctic" im Südlichen Eismeere. Von Prof. Dr. A. Supan.

The meteorological observations from the log of the "Antarctic" are here published with a brief discussion.

Arctic Ballooning. *C.R.* **120** (1895): 1199–1202. **Faye.**

Rapport sur le projet d'expédition en ballon aux régions polaires. De M. J. A. Andrée. (Commissaires: MM. Faye, Daubrée, Blanchard; Faye, rapporteur.)

Arctic Ballooning. *Verh. Ges. Erdk. Berlin* **22** (1895): 533–538. **Moedebeck.**

Die Polar-Forschung mittelst Luftballons. Von Hermann Moedebeck.

The result of this criticism of Mr. Andrée's proposed balloon journey is favourable to the probable success of the plan; but the unlikelihood of good scientific observations being possible in so short a period as is contemplated is pointed out.

Arctic Ballooning. **Baschin.**

Andrées Vorschlag einer Nordpolexpedition im Luftballon. Von Otto Baschin. (Sonderabdruck aus der Geographischen Zeitschrift, hrsg. von A. Hettner, I. Jahrgang, 1895.) Leipzig: B. G. Teubner. Size 10 × 6¼, pp. 6. *Presented by the Author.*

Arctic Ballooning. *Rev. Scientifique* (4) **3** (1895): 753–755. **Rabot.**

Un projet d'exploration polaire aéronautique. Par M. Charles Rabot.

Arctic Ocean—Kara Sea. *J. Tyneside G.S.* **3** (1895): 123–126. **Wiggins.**

Lecture on the Kara Sea Navigation. By Captain Wiggins.

Arctic—Peary Auxiliary Expedition. **Bryant.**

The Peary Auxiliary Expedition of 1894. By Henry G. Bryant. With Supplementary Reports by Prof. T. C. Chamberlin (Geology), Dr.

Axel Ohlin (Zoology). [Reprint from *Bulletin of Geographical Club*, No. 5.] Philadelphia, 1895. Size 9½ × 6, pp. 78. *Maps and Plates. Presented by the Author.*

Mr. Bryant was in command of the expedition of 1894 for the relief of Mr. Peary.

Franklin's Arctic Expeditions. *Scottish G. Mag.* 11 (1895): 329–335. **Dalgleish.**

Notes on Franklin's Arctic Expeditions. By W. Scott Dalgleish. *With Map and Portraits.*

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Astronomy—Nebular Theory. **Stanley.**

Notes on the Nebular Theory in relation to Stellar, Solar, Planetary, Cometary, and Geological Phenomena. By William Ford Stanley. London: Kegan Paul & Co., 1895. Size 8½ × 6, pp. xvi. and 260. *Plates. Presented by the Author.*

While the greater part of this book deals with matters of astronomical speculation, the chapters on the Conditions of the Cooling Earth and on the Condition of Earth-Formation approach the geographical standpoint from which certain geological problems may legitimately be viewed.

Geological hypotheses. **Kuntze.**

Geogenetische Beiträge. Von Dr. Otto Kuntze. Leipzig: Gressner and Schramm, 1895. Size 9 × 6½, pp. 78. *Illustrations. Presented by the Author.*

This pamphlet contains several papers, the first suggesting that the Andes might have originated by a single oscillation of the Earth's crust, the second discussing denudation in deserts at the present time and in the Upper Carboniferous period, while others deal with the origin of saltpetre deposits, the fossilization of wood, and, at great length, with the origin of coal.

Mountains and Peoples. **Ratzel.**

Wissenschaftliche Veröffentlichungen des Vereins für Erdkunde zu Leipzig. Zweiter Band. Anthropogeographische Beiträge. Zur Gebirgskunde vorzüglich Beobachtungen über Höhengrenzen und Höhengürtel. Herausgegeben im Auftrage des Vereins für Erdkunde und der Carl Ritter-Stiftung zu Leipzig, von Friedrich Ratzel. Leipzig: Duncker & Humblot, 1895. Size 10 × 6½, pp. viii., 172, and 362*. *Maps and Plates.*

This will be referred to in the Monthly Record.

Oceanography—Baltic. **Credner.**

Gesellschaft Deutscher Naturforscher und Aerzte. Verhandlungen 1895. Allgemeiner Theil. Rudolf Credner. Ueber die Ostsee und ihre Entstehung. Vortrag gehalten in der 3 allgemeinen Sitzung der 67 Versammlung Deutscher Naturforscher und Aerzte in Lübeck am 20 Sept. 1895. Leipzig: J. C. W. Vogel, 1895. Size 9½ × 7, pp. 26. *Presented by the Author.*

This will be noticed in the Monthly Record.

Oceanography—Bay of Biscay. *B.S.G. Com. Bordeaux* 18 (1895): 297–317. **Hautreux.**

Golfe de Gascogne. Températures de la mer sur la côte des Landes et dans le Bassin d'Arcachon. Par A. Hautreux.

A note on this paper will appear in the Monthly Record.

Oceanography—Bay of Biscay. *B.S.G. Comm. Bordeaux* 18 (1895): 455–467. **Hautreux.**

Côte des Landes et bassin d'Arcachon; densités de la surface de la mer. Par A. Hautreux. *With Diagrams.*

This is noticed in the Monthly Record.

Oceanography—Challenger Voyage. **Murray.**

Report on the Scientific Results of the Voyage of H.M.S. *Challenger* during the years 1872–76, under the command of Captain Sir G. S. Nares, and the late Captain F. T. Thomson. Prepared under the superintendence of the late Sir C. Wyville Thomson, and now of John Murray. A Summary of the Scientific Results. 2 Parts (with Appendices). London:

Eyre & Spottiswoode, 1895. Size 13 × 10½, pp. liv., 1608, 32, viii., and 38. *Maps and Plates. Price (First and Second Parts)* 80*s*. *Presented by the Lords of the Treasury.*

This was reviewed in the *Journal* for April (vol. v. p. 360).

Oceanography—Temperature. *Petermanns M.* **41** (1895): 153–159. **Schott.**

Die jährliche Temperaturschwankung des Ozeanwassers. Von Dr. Gerhard Schott. *With Map.*

Dr. Schott has produced a most interesting and valuable map, which illustrates the extremes of ocean temperature from an annual range of under 1° C. in the equatorial region to over 10° C. in the enclosed seas of Europe, and off the east coasts of North America and Asia. The higher mean range in the northern hemisphere is very striking.

Photographic Surveying. **Rousson.**

Application de la Photographie au Levé de Plan. La Photogrammètrie. Par Henri Rousson. *With Illustrations.* From *Science Française* 5 (1895): 52–54.

Physical Geography. *B.S.G. Paris* (7) **16** (1895): 149–176. **Lapparent.**

La distribution des conditions physiques à la surface du globe. Par M. Albert de Lapparent. *With Maps.*

A study of the physical relations, and especially of the meteorology of the Earth's surface as a whole, designed to show the controlling power of land-forms on such phenomena, and the consequent necessity of ascertaining the method of origin of these forms.

Terrestrial and Celestial Globes. **Fiorini and Günther.**

Erd- und Himmels-globen, ihre Geschichte und Konstruktion. Nach dem italienischen Matteo Fiorinis, frei bearbeitet von Siegmund Günther. Leipzig: B. G. Teubner, 1895. Size 10 × 7, pp. vi. and 138. *Price* 4 *marks. Presented by the Publisher.*

We have already (vol. iv. p. 580) drawn attention to Prof. Fiorini's work. Dr. Günther has done good service in preparing a German edition, which, while a free translation of the Italian, is both more comprehensive and more precise than the original. It deals fully, for the first time in the German language, with the actual drawing of the gores for a globe, and gives the formulæ by which this has been done by the great globe-makers from the earliest times. We could have desired more numerous illustrations, both of globes and in the way of mathematical diagrams.

GENERAL.

Biographical Dictionary. **Lee.**

Dictionary of National Biography. Edited by Sidney Lee. Vol. xliii. Owens—Passelewe; Vol. xliv. Paston—Percy. London: Smith, Elder & Co., 1895. Size 10 × 7, pp. (vol. xliii.) vi. and 452; (vol. xliv.) vi. and 448. *Price of each vol.* 15*s*.

The following names, of geographical interest, are included among the notices in these volumes:—Vol. xliii.: John Oxley, by the late H. M. Chichester; William Gifford Palgrave, by J. A. Hamilton; John Palliser, by G. C. Boase; Edward Henry Palmer, by Stanley Lane-Poole; Sir Woodbine Parish, by Charles Parish; Mungo Park, by W. Carr; Sir Harry Smith Parkes, by S. Lane-Poole; Mansfield Parkyns, by T. Seccombe; Sir William Edward Parry, by Prof. J. K. Laughton; and Abraham Parsons, by the late H. M. Chichester.—Vol. xliv.: William Paterson, by C. A. Harris; Thomas Pellow, by T. Seccombe; Sir Lewis Pelly, by Major Broadfoot; Thomas Pennant, by W. Wroth; Joseph Barclay Pentland, by G. C. Boase; and Robert Percival, by C. R. Beazley.

Biography—Abich. **Abich.**

Aus Kaukasischen Ländern. Reisebriefe von Hermann Abich. Herausgegeben von dessen Witwe. Erster Band. Briefe aus den Jahren 1842–1853 an seine Eltern und Geschwister. Zweiter Band. Briefe aus den Jahren 1859–1874 an seine Frau. Vienna: A. Hölder, 1896 [1895]. Size 10 × 6½, pp. (vol. i.) xii. and 608; (vol. ii.) viii. and 314. *Portrait. Presented by Frau Abich.*

The widow of the famous explorer of the Caucasus, Hermann Abich, has published the family letters written by him when engaged in his Caucasian investigations. He was born in 1806, and made his first journey to the Caucasus in 1844. The first volume contains letters written to his parents and sisters from 1844 to 1853, while the second and smaller volume contains letters written to his wife from 1859 to 1874. He died in 1886. These letters give a very full and lively account of Abich's travels; many of them are of great length and full of incident, while the results of his geological investigations are given in a very readable form.

Biography—Lyell. **Bonney.**

The Century Science Series. Charles Lyell and Modern Geology. By Professor T. G. Bonney. London: Cassell & Co., 1895. Size 7¼ × 5, pp. 224. *Portrait. Price* 3*s.* 6*d. Presented by the Publishers.*

Professor Bonney's biography of Lyell is designed to show how the life of the great geologist became "an apologue setting forth the beneficial results of concentrating the whole energy on one definite object, and the moral grandeur of a calm, judicial, truth-seeking spirit."

Book of Reference—Gazetteer. **Chisholm.**

Longmans' Gazetteer of the World. Edited by George G. Chisholm. London: Longmans & Co., 1895. Size 11½ × 9, pp. xii. and 1788. *Price* 42*s. Presented by the Publishers.*

Mr. Chisholm's *Gazetteer* supplies one of the most keenly felt wants of the practical man who requires occasional information of an exact, authoritative, and recent character as to places. It will be referred to in a special notice.

Colonization. **Dubois.**

Marcel Dubois. Systèmes coloniaux et Peuples colonisateurs. Dogmes et faits. Paris: G. Masson and E. Plon & Co, 1895. Size 7½ × 5, pp. xvi. and 290. *Price* 3*s.*

This is a series of thoughtful essays on the theory and history of colonization, with special reference to countries other than France, and forms the substance of a course of lectures given by Professor Dubois.

Commercial Geography—Ocean Routes. **Schott.**

Z. Ges. Erdk. Berlin **30** (1895): 235–300.

Die Verkehrswege der transozeanischen Segelschiffahrt in der Gegenwart. Von Dr. Gerhard Schott. *With Plates.*

This is an admirable piece of work coming from the German Marine Observatory in Hamburg. Dr. Schott illustrates his discussion of the routes of modern sailing ships by three maps, showing (1) the chief sailing routes of the world; (2) lines of equal duration of voyage from the Lizard, outward; (3) lines of equal duration of voyage to the Lizard, homeward; and also by a series of four synoptic weather-charts off Cape Horn in stormy weather.

Historical—Bianco's Map. *Mem. S.G. Italiana* **5** (1895): 202–225. **Errera.**

Della carta di Andrea Bianco del 1448 e di una supposta scoperta dei Brasile nel 1447. Memoria di Carlo Errera. *With two Sketch-maps.*

A critical and controversial paper, in large part occupied by considering Mr. Yule Oldham's interpretation of the inscription on the map. In the writer's opinion "1500" is really "| 500 |."

Historical—Geographical Progress. **Maunoir.**

Société de Géographie de Paris. Rapports Annuels sur les Progrès de la Géographie 1867–1892. Par C. Maunoir. Tome Premier 1867–1875. Paris: E. Leroux, 1895. Size 10 × 6½, pp. 670. *Portraits and Maps. Presented by the Author.*

M. C. Maunoir is republishing in volume form the annual reports of the progress of geography which he has compiled for the Paris Geographical Society since 1867. The first volume, coming down to 1875, presents a complete history of geographical work for the period under consideration, and its value is enormously enhanced by an index of the names of travellers and authors.

Historical—Maps. **Wauwermans.**

Histoire de l'École Cartographique Belge et Anversoise du XVI^e^ siècle. Par le Lieutenant-Général Wauwermans. 2 vols. Bruxelles: Institut National de Géographie, 1895. Size 10 × 6½, pp. (vol. i.) 402; (vol. ii.) 470. *Plates. Presented by the Author.*

This work has a much wider scope than the title indicates. It traces the growth

of cartography from the earliest period, and chapters are devoted to Greek Geography, Roman Itineraries, the Progress of Navigation, Portulani, and the Geographical Renaissance in Part I. Part II. deals in seven chapters with the history of Antwerp and the state of its trade in the sixteenth century, and this completes the first volume. The second volume contains an account of the great Flemish cartographers, Gemma Frisius, Mercator, and Ortelius in Part III.; and in Part IV. deals with the lesser cartographers, Ortelianus, Hondius, and their followers. The work has been appearing in instalments in the *Bulletin* of the Antwerp Geographical Society, vols. 17 to 20, during the years 1892–1895.

Institution of Civil Engineers—Library Catalogue.

Catalogue of the Library of the Institution of Civil Engineers. Three vols. London: Published by the Institution, 1895. Size 8½ × 6, pp. (vol. i.) iv. and 516; (vol. ii.) iv. and 582; (vol. iii.) iv. and 582. *Presented by the Institution.*

This is a full alphabetical catalogue arranged under authors' names as far as possible, but with subject or official names in the same alphabet in the case of anonymous or official publications. The type is large, and the entries, printed across the page, have abundant space, the clearness of the references being thus a compensation for the greater bulk of the work.

Institution of Civil Engineers—Proceedings—Subject Index.

Minutes of Proceedings of the Institution of Civil Engineers. Subject Index; Volumes lix. to cxviii. Sessions 1879–80 to 1893–94. London: 1895. Size 8½ × 6, pp. iv. and 534. *Presented by the Institution.*

An alphabetical subject-index for the sixty volumes of Minutes of Proceedings published during the last fifteen sessions of the Institution of Civil Engineers, and containing references to a large number of papers of considerable geographical importance.

Languages, etc. **Cust.**

Linguistic and Oriental Essays. Written from the year 1861–1895. Fourth Series. By Robert Needham Cust, LL.D. London: Luzac & Co., 1895. Size 8½ × 6, pp. xvi. and 634. *Presented by the Author.*

This volume is divided into Part I., Linguistic, including a number of essays, obituary notices, and criticisms; Part II., India; Part III., Africa; Part IV., Religion; and Part V., Miscellaneous. It contains altogether seventy-six articles.

Mountain Railways. *P.I. Civil Engineers* **120** (1895): 2–150. **Various Authors.**

The St. Gothard Mountain Railway and the Stanzerhorn Cable-Railway. By Sigvord Johnson Berg.
The Monistrol-Montserrat Rack-Railway. By Alfred Collett.
The Usui Mountain Railway, Japan. By C. A. W. Pownall.

This set of papers, accompanied by a long discussion, may be looked upon as a complete account of mountain railways, as almost every mountain railway in existence is referred to at one part or another of the discussion, if not in the papers.

Voyages and Travels. **Brassey.**

Voyages and Travels of Lord Brassey, K.C.B., D.C.L., from 1862 to 1894. Arranged and Edited by Captain S. Eardley-Wilmot. Two vols. London: Longmans & Co., 1895. Size 8½ × 6, pp. (vol. i.) 344; (vol. ii.) 292. *Maps. Price* 10*s. Presented by the Publishers.*

These interesting voyages cover a period of over thirty years, commencing with a trip to Algeria in 1862, and continuing to a voyage to India in 1894. Previously given as lectures, as letters to newspapers, or as magazine articles, the various chapters are now collected in a convenient form. The frontispiece is a map of Lord Brassey's voyages from 1856 to 1894, and the maze of coloured lines shows an amount of travelling very rarely placed to the credit of any one but a professional sailor.

NEW MAPS.

By J. Coles, *Map Curator*, R.G.S.

EUROPE.

Algäuer Alps. **Halbfass.**

Tiefen einiger Seen der Algäuer Alpen. Von Dr. Wilhelm Halbfass. Scale 1: 25,000 or 2·5 inches to a stat. mile. 1. Hopfensee. 2. Weissensee. 3. Alpsee. 4. Haldensee, Vilsalpsee. Petermanns 'Geographische Mitteilungen,' Jahrgang 1895. Tafel 15. Gotha: Justus Perthes. *Presented by the Publisher.*

Denmark. **Danish General Staff**

Generalstabens topografiske Kaart over Denmark. Scale 1 : 40,000 or 1·5 inch to a stat. mile. Kalkograferet og graveret ved generalstaben, Kjobenhavn, 1895. Sheets—Asaa, Dronninglund, Hals. *Presented by the Danish General Staff, through H.E. the Danish Minister.*

England and Wales. **Ordnance Survey.**

Publications since October 7, 1895.

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Europe.

Carte géologique internationale de l'Europe, 49 feuilles à l'échelle de 1 : 1,500,000 or 23·6 stat. miles to an inch. La carte, votée au Congrès géologique international de Bologne en 1881, est exécutée conformément aux décisions d'une Commission internationale, avec le concours des Gouvernements, sous la direction de MM. Beyrich et Hauchecorne. Livraison I. (containing 6 sheets). Berlin : Dietrich Riemer, 1895.

These are the first six sheets of a geological map of Europe which is in course of publication, and which is being prepared in conformity with a resolution passed by the International Geological Congress of Bologne, 1881. The maps in the present issue contain Iceland, Northern Germany, and a part of Western Russia. This important map will be completed in 49 sheets. The colours are well chosen, and the registering is perfect.

Sweden. **Generalstabens topografiska afdelning, Stockholm.**

Generalstabens karta öfver Sverige. Scale 1 : 100,000 or 1·5 stat. mile to an inch. Sheet 62, Åmål.—Karta öfver Norbottens Län. Scale 1 : 200,000 or 3·1 stat. miles to an inch. Sheets 34, Storafvan; 36, Boden; 43, Jörn (Boksele), Generalstabens topografiska afdelning, Stockholm. *Presented by the Topographical Section of the Swedish General Staff.*

ASIA.

Russia. **Ssibiriakóff.**

Wasserstrassen-Verbindungen in Sibirien. Nach den Projekten, von A. Ssibiriakóff. Scale 1 : 7,000,000 or 110·5 stat. miles to an inch. Petermanns 'Geographische Mitteilungen,' Jahrgang 1895. Tafel 16. Gotha : Justus Perthes, 1895.

AFRICA.

Rhodesia. **Stanford.**

A Map of Rhodesia divided into provinces and districts, under the administration of the British South Africa Company, 1895. Scale 1 : 1,000,000 or 15·8 stat. miles to an inch. Published by Edward Stanford, London. 6 sheets. *Price* 15*s.*

In the compilation of this map all the most recent and reliable material has been used. A new feature in the map is the manner in which the boundaries of districts, provinces, and native reserves are shown. The positions of gold-fields in the course of development are indicated, and all roads, railroads, and telegraph-lines are laid down. The altitudes above sea-level are given in feet, and the position of hilltops are indicated. Notes describing the nature of the country, and other items of information, appear in many parts of the map.

AMERICA.

California and Nevada. **Whitaker & Ray Co.**

New Map of California and Nevada, compiled from the latest and most reliable official sources and special surveys, 1895. Scale 1 : 760,320 or 12 stat. miles to an inch. Published by the Whitaker & Ray Co., San Francisco. 4 sheets.

The means of communication by road and rail are clearly shown on this map. It contains an inset of the congressional and senatorial districts of California. Though roughly drawn, it will be found useful for reference to those who are commercially interested in California.

Chili. **Bianconi.**

République du Chili. Scale 1 : 2,500,000 or 39·2 stat. miles to an inch. Cartes commerciales, physiques, politiques, administratives, routières ethnographiques, minières et agricoles avec Notice Descriptive comprenant les renseignements. Par F. Bianconi, Ingénieur geographe (avec la collaboration des principaux voyageurs français). Publiées par la Librairie Chaix. Chaque carte avec texte, prix cartonné. 4 *francs*.

This is the latest issue of a useful series of commercial maps which has been for some years past in course of publication. In addition to the map, a considerable amount of statistical information with regard to the exports and imports, railways, finance, commerce, etc., is given, with notes on the history, geography, and administration of Chili.

GENERAL.

Ancient Atlas. **v. Spruner-Sieglin.**

v. Spruner-Sieglin, Hand-Atlas zur Geschichte des Altertums, des Mittelalters und der Neuzeit. I. Abteilung: Atlas Antiquus. Atlas zur Geschichte des Altertums. 34 kolorierte Karten in Kupferstich enthaltend 19 übersichtsblätter, 94 historische Karten und 73 Nebenkarten. Entworfen und bearbeitet von Dr. Wilhelm Sieglin. Fünfte Lieferung. Gotha: Justus Perthes, 1895. *Price 2·50 marks each part.*

The present issue contains the following maps: No. 9, Imperia Persarum et Macedonum Alexandri Magni tempore; No. 10, Regna Diadochorum et Parthorum; No. 20, Mauretania, Africa, Cyrenaica; No. 27, Imperium Romanum saeculis p. Chr. secundo et tertio. In addition to the principal maps, insets are given.

Facsimile Maps. **Müller.**

Die ältesten Weltkarten. Herausgegeben und erläutert von Dr. Konrad Müller, Prof. am K. Realgymnasium in Stuttgart. III. Heft: Die kleineren Weltkarten. Mit 74 Abbildungen im Text und 4 Tafeln in Farbendruck. Stuttgart: Jos. Roth'sche Verlagshandlung, 1895.

This is the third issue of this atlas, and contains the following maps with explanatory text: I. Die beiden karten des hl. Hieronymus; II. Die Weltkarte des Heinrich von Mainz; III. Die Cottoniana; IV. Die Psalterkarte von London; V. Die Weltkarte Lamberts von St. Omer (c. 1120); VI. Die 2 Karten des Guido in Brüssel a. 1119 (gu); VII. Die Weltkarte von Albi (8 Jahrhundert); Das Erdbild des Kosmas Indopleustes; IX. Der Situs Jerusalem (11 Jahrhundert) in 8 Abschriften; X. Die Karten des Matthaeus Parisiensis, c. 1250 (Mt.); XI. Die Karten des Ranulf Higden, 1363 (8 Kopien); XII. Die Sallustkarten (Sa) [8 grössere, 6 kleinere]; XIII. Die T-Karten; XIV. Die Macrobiuskarten; XV. Karten der Klimate; XVI. Die Darstellung der Erde auf Münzen; XVII. Die Weltkarten des Marino Sanuto, Petrus Vesconte und Paulinus von Puteoli, c. 1320; XVIII. Die Weltkarte von Ste.

Geneviève in Paris, c. 1370; XIX. Die Mekakarte in Reims a. 1417; XX. Die Karten des Dati a. 1422; XXI. Die Genfer Sallustkarte (15 Jahrhundert); XXII. Die Weltkarte des Andrea Bianco a. 1436; XXIII. Die Weltkarten und der Plan von Jerusalem des Johannes von Udine (1363); XXIV. Die Karte Walspergers a. 1448; XXV. Die Borgiakarte in Rom (15 Jahrhundert); XXVI. Nachtrag und verloren gegangene Karten; XXVII. Die Oxforder Karte von Palästina (13 Jahrhundert); XXVIII. Das Itinerarium Sigerics von Rom nach Canterbury a. 992 994.

The World. **Paris.**

Atlas Melin, Historique et Géographique, Spécialement établi pour les Examens du Baccalauréat et de Saint-Cyr. (No. 1.) 153 Cartes ou Plans. André Paris, Editeur, à Moulins-sur-Allier.

This atlas has been specially prepared for the use of military and university students in France. It is divided into two parts, the first of which is devoted to the historical geography of Europe from 1610 to 1895. The second part contains political, physical, and industrial maps, chiefly relating to France and her colonies. Each map is accompanied by letterpress. The present issue contains 153 maps. They are printed in colours, and care has been taken not to overcrowd them with names.

PHOTOGRAPHS.

Finland. **Ståhlberg.**

45 Photographs of Finland, taken by K. E. Ståhlberg, Helsingfors. *Presented by the Geographical Society of Finland.*

The scenery, buildings, fisheries of Finland are well illustrated by this series of photographs. The subjects have been well chosen, and the photographs themselves are remarkably good.

Greenland. **Libbey.**

194 photographs, taken by Prof. W. Libbey during his visit to the west coast of Greenland. *Presented by Prof. W. Libbey.*

This is a very complete series of photographs taken by Professor Libbey during his visit to the Arctic Regions in connection with the Peary Expedition. Many of them illustrate glacier formation on the west coast of Greenland, in addition to which there are numerous views of the Danish settlements, coast scenery, and natives. They are most creditable specimens, and will be found of great value to those interested in the study of physical geography.

St. John's, Newfoundland. **Libbey.**

10 Photographs of St. John's, Newfoundland, taken by Prof. W. Libbey. *Presented by Prof. W. Libbey.*

These photographs have been taken by Professor Libbey at St. John's, Newfoundland, and convey a very good idea of the city and the surrounding scenery.

Sandwich Islands. **Libbey.**

118 Photographs of Sandwich Islands, taken by Prof. W. Libbey. *Presented by Prof. W. Libbey.*

In this interesting series of photographs Professor Libbey has given special attention to the volcanoes and lava-beds of the Sandwich Islands, and his photographs of these would alone form a valuable accession to the Society's collection; but, in addition to these, there are numerous photographs illustrating the beautiful scenery of the islands.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.

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